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Specification and Drawings, as originally filed, with Application for Patent Serial No: **2,416,741**, on January 20, 2003, by **DIMPLEX NORTH AMERICA LIMITED**, assignee of Kristoffer Hess, Kelly Stinson and Richard Adamczyk, for "Flame Simulating Assembly".

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ABSTRACT

A flame simulating assembly having a light source operable to produce a plurality of images of flames, a first screen, and a second screen. The first screen is adapted to transmit light from the light source to produce a first image of flames appearing through the first screen. The second screen is adapted to transmit a second image of flames appearing through the second screen.

FLAME SIMULATING ASSEMBLY

FIELD OF THE INVENTION

[0001] The present invention relates to a flame simulating assembly for displaying images of flames through two screens simultaneously.

BACKGROUND OF THE INVENTION

[0002] Various types of flame simulating assemblies are known. Often, a flame simulating assembly is designed to simulate a fire in a real fireplace. For example, U.S. Patent No. 5,642,580 (Hess et al.) discloses a flame simulating assembly including a light source, a flame effect element for producing a moving flame effect, a flicker element to cause light from the light source to flicker, a screen through which an image of flames is transmitted, and a simulated fuel bed.

[0003] On occasion, a two-sided flame simulating assembly is needed. The need typically arises where a two-sided flame simulating assembly is to be included in an interior wall, so that those in the rooms on both sides of the interior wall can simultaneously enjoy the benefits of a flame simulating assembly.

[0004] Typically, a two-sided flame simulating assembly is created by positioning two conventional flame simulating assemblies back-to-back, i.e., a back wall of a first conventional flame simulating assembly is positioned adjacent to a back wall of a second conventional flame simulating assembly. Alternatively, a two-sided flame simulating assembly is often created by attaching two conventional flame simulating assemblies together, back-to-back. Although these known techniques for making a two-sided flame simulating assembly may achieve the desired effect to a limited extent, known two-sided flame simulating assemblies, created using conventional flame simulating assemblies, have a number of disadvantages. First, using two conventional flame simulating assemblies as a two-sided flame simulating assembly is only feasible where the interior wall in which the conventional flame simulating assemblies are to be positioned is sufficiently thick to receive them. Second, using two conventional flame simulating

assemblies back-to-back is relatively expensive, as all of the materials and controls for each of the conventional units are duplicated.

[0005] In addition, because two conventional units positioned back-to-back result in a relatively broad configuration, an interior wall in which the two conventional back-to-back units are received generally has barely enough thickness for the purpose. The result is that the screens through which images of flames are transmitted in the conventional back-to-back flame simulating assemblies tend to be relatively closely positioned to an observer. This is undesirable because, in general, where there is more distance between the observer and the screen, the image of flames produced tends to be perceived by the observer as being more realistic. Accordingly, using two conventional flame simulating assemblies as a two-sided flame simulating assembly tends to provide somewhat unsatisfactory results.

[0006] Also, where two conventional flame simulating assemblies are formed into a two-sided flame simulating assembly, the effects resulting are merely the same images of flames producible by each of the conventional flame simulating assemblies separately. Achieving any additional or somewhat improved effects is not feasible where two conventional flame simulating assemblies are positioned or joined back-to-back.

[0007] There exists a need for a flame simulating assembly adapted to display images of flames through two screens simultaneously to overcome the defects of known two-sided flame simulating assemblies.

SUMMARY OF THE INVENTION

[0008] In a broad aspect of the present invention, there is provided a flame simulating assembly having a light source operable to produce a plurality of images of flames, a first screen and a second screen. The first screen is adapted to transmit light from the light source to produce a first image of flames appearing through the first screen.

Also, the second screen is adapted to transmit a second image of flames appearing through the second screen.

[0009] In another aspect, the first screen and the second screen are positioned opposite each other.

[0010] In another aspect, the first screen and the second screen define substantially vertical planes respectively and said at least one light source is positioned b tween said planes.

[0011] In yet another aspect, the flame simulating assembly additionally includes a flicker element for creating a fluctuating light. The flicker element is positioned in a path of light from the light source to a screen selected from the group consisting of the first screen and the second screen. The result is that the fluctuating light is transmitted through the screen to produce an image of flames appearing through said screen.

[0012] In another alternative aspect, the flame simulating assembly additionally includes a flame effect element for configuring light from the light source to simulate flames. The flame effect element is positioned in a first path of light between the light source and the first screen and in a second path of light between the light source and the second screen. The result is that light from the light source is configured by the flame effect element to simulate flames and transmitted through the first screen and the second screen to produce the first image and the second image of flames respectively.

[0013] In another aspect of the present invention, there is provided a flame simulating assembly additionally including a first flicker element for creating a fluctuating light to produce a first image of flames. The first flicker element is positioned in a first path of light between the light source and the first screen. The flame simulating assembly also includes a second flicker element for creating a fluctuating light to produce a second image

of flames, the second flicker element being positioned in a second path of light between the light source and the second screen.

[0014] In another aspect, the flame simulating assembly additionally includes a first simulated fuel bed and a second simulated fuel bed. The first simulated fuel bed and the second simulated fuel bed are positioned adjacent to the first screen and the second screen respectively such that the first image of flames and the second image of flames appear above the first simulated fuel bed and the second simulated fuel bed respectively.

[0015] In yet another aspect of the invention, the flame simulating assembly has a first simulated fuel bed, a second simulated fuel bed, a light source, a first screen, and a second screen. The light source is operable to produce a plurality of images of flames. The first screen is positioned behind the first simulated fuel bed for transmitting light from the light source to produce a first image of flames appearing through the first screen above the first simulated fuel bed. Also, the second screen is positioned behind the second simulated fuel bed for transmitting light from said at least one light source to produce a second image of flames appearing through the second screen above the second simulated fuel bed.

[0016] In another aspect, the flame simulating assembly includes a flame effect element having one or more apertures positioned to permit light from the light source to pass through the apertures to the second screen. In addition, the flame effect element includes one or more reflective regions for reflecting light from the light source to said first screen to provide images of flames.

[0017] In an alternative aspect of the invention, the flame simulating assembly includes screens, each with a pattern for simulating a firebrick wall to a viewer of the image of flames transmitted through each screen.

[0018] In another aspect of the invention, each of the first screen and the second screen includes a partially reflective front surface positioned behind the first simulated fuel bed and the second simulated fuel bed resp ctively, and a back surface for diffusing the fluctuating light and transmitting the fluctuating light to the front surface.

[0019] In an alternative aspect of the invention, the first screen and the second screen of the flame simulating assembly each includes a top region positioned distal from the first simulated fuel bed and the second simulated fuel bed respectively. The top regions of the first screen and the second screen are adapted to permit a viewer to see through the top regions.

[0020] In yet another aspect of the invention, each of the first screen and the second screen in the flame simulating assembly is positioned within the flame simulating assembly body to maintain the screens in substantially upright positions. Each of the first screen and the second screen includes a top edge distal from the first simulated fuel bed and the second simulated fuel bed respectively. The top edges of the screens are spaced apart from an upper portion of the body to define an opening through the flame simulating assembly so that a viewer can see through the opening.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The invention can be better understood by reference to the attached drawings, in which:

[0022] Fig. 1 is an isometric view of a front side of a preferred embodiment of the flame simulating assembly showing a screen and a simulated fuel bed;

[0023] Fig. 2 is an isometric view of a rear side of the flame simulating assembly of Fig. 1, with a screen and a simulated fuel bed removed;

[0024] Fig. 3 is an elevation view of the front side of the flame simulating assembly of Fig. 1;

[0025] Fig. 4 is an isometric side view of the flame simulating assembly of Fig. 1 with a simulated fuel bed removed;

[0026] Fig. 5 is a side view of the flame simulating assembly of Fig. 1;

[0027] Fig. 6 is a side view of the flame simulating assembly of Fig. 3, with certain elements removed, taken along line 6-6 in Fig. 3;

[0028] Fig. 7 is a top view of the flame simulating assembly of Fig. 3 from the top, taken along line 7-7 in Fig. 3;

[0029] Fig. 8 is a side view of another embodiment of the flame simulating assembly;

[0030] Fig. 9 is a section view taken from the top of the flame simulating assembly of Fig. 8;

[0031] Fig. 10 is an isometric view of another embodiment of the flame simulating assembly including a flame effect element with reflective portions thereon;

[0032] Fig. 11 is a side view of the flame simulating assembly of Fig. 10;

[0033] Fig. 12 is a side view of another embodiment of the flame simulating assembly including a flame effect element with a cutout portion and a reflective portion and a single flicker element, drawn at a smaller scale;

[0034] Fig. 13 is a front view of the flame effect lement includ d in the flame simulating assembly of Fig. 12, drawn at a larger scale;

[0035] Fig. 14 is a back view of the flame effect element of Fig. 13;

[0036] Fig. 15 is a front view of another embodiment of the flame simulating assembly of the invention, drawn at a smaller scale;

[0037] Fig. 16 is a side view of the flame simulating assembly of Fig. 15 taken along section 16-16, drawn at a smaller scale;

[0038] Fig. 17 is a top view of the flame simulating assembly of Fig. 15, taken along section 17-17;

[0039] Fig. 18 is a front view of a screen included in the flame simulating assembly of Fig. 15, drawn at a larger scale;

[0040] Fig. 19 is a front view of an alternative embodiment of a screen;

[0041] Fig. 20 is a top view of another embodiment of the flame simulating assembly of the invention showing two simulated fuel beds in position, drawn at a smaller scale;

[0042] Fig. 21 is a side view of the preferred embodiment of the flame simulating assembly showing two simulated fuel beds in position;

[0043] Fig. 22 is a side view of another embodiment of the flame simulating assembly, excluding simulated fuel beds;

[0044] Fig. 23 is a side view of another embodiment of the flame simulating assembly;

[0045] Fig. 24 is a side view of another embodiment of the flame simulating assembly; and

[0046] Fig. 25 is a top view of the flame simulating assembly of Fig. 24.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0047] Reference is first made to Figs. 1-7 to describe a preferred embodiment of a flame simulating assembly indicated generally by the numeral 30 in accordance with the invention. As can be seen in Figs. 1 and 3, the flame simulating assembly 30 includes a first screen 32 positioned behind a first simulated fuel bed 34. Figs. 4-7 show that the flame simulating assembly 30 also includes a light source 36 operable to produce a plurality of images of flames. The light source 36 is positioned between the first screen 32, and a second screen 38 (Figs. 5 and 6). The first screen 32 is adapted to transmit light from the light source 36 to produce a first image of flames appearing through the first screen 32. In addition, the second screen 38 is adapted to transmit a second image of flames appearing through the second screen 38.

[0048] Preferably, and as shown in Figs.4-7, the first screen 32 and the second screen 38 are positioned substantially opposite to each other in the flame simulating assembly 30. As can be seen in Fig. 5, the first screen 32 and the second screen 38 define a first plane 40 and a second plane 42 respectively. Preferably, the light source 36 is positioned between the planes 40, 42.

[0049] In the preferred embodiment, and as shown in Figs. 4 - 6, the flame simulating assembly 30 preferably includes first and second flicker elements 44, 46 for creating a fluctuating light. The first flicker element 44 is positioned in a first path of light (represented by schematic paths of light 47, 48) between the light source 36 and the first

screen 32. Similarly, the second flicker element 46 is positioned in a second path of light (represented by schematic paths of light 49, 50) between the light source 36 and the second screen 38. The fluctuating light from the light source 36 is transmitted through the first screen 32 and the second screen 38 respectively to produce images of flames appearing through the first screen 32 and the second screen 38 simultaneously.

[0050] Preferably, the flame simulating assembly 30 includes a flame effect element 52 positioned between the first screen 32 and the second screen 38, for configuring light from the light source 36 to simulate flames.

[0051] It will be appreciated that the second screen 38 is omitted from Figs. 2, 4 and 7 in order to show details of the construction of the flame simulating assembly 30, as will be described. It will also be appreciated that a second simulated fuel bed 54 (Fig.12) is omitted from Figs. 2 and 4 - 7 in order to show details of the construction of the flame simulating assembly 30 which would otherwise not be shown.

[0052] Although other types of flicker elements could be used, preferably, the flicker elements 44, 46 are of the type (the "rotisserie" type) described in U.S. Patent No. 5,642,580, in which a plurality of reflective strips 51 are radially arranged around a central axis 53. By way of example, the preferred embodiment of the flicker element 44 can best be seen in Fig. 7. For convenience, the plurality of strips 51 is represented in Fig. 4 by single examples of the strips, it being understood that the flicker elements 44, 46 include several reflective strips 51, as shown (in the case of flicker element 44) in Fig. 7. As is known in the art, the flicker elements 44, 46 are rotated by electric motors (not shown).

[0053] As can be seen in Fig. 2, in the preferred embodiment, the flame simulating assembly 30 includes a body 56 constructed primarily of sheet metal which has been formed into panels fastened together by rivets or other suitable fasteners, as is known in the art. The body 56 includes screen frames 58 for receiving and supporting each of the first screen 32 and the second screen 38 in position. Also, the body 56

includes flame effect element supports 60 positioned at the ends of the flame effect element 52, for maintaining the flame effect element 52 in a raised and substantially vertical position, as can best be seen in Fig. 2. Top panels 57 and a bottom panel 59 provide structural strength to the body 56. A deck portion 62 includes an aperture 64 with a ledge 66 around part of the perimeter thereof, the ledge 66 being adapted for supporting the simulated fuel beds 34, 54. Although various arrangements could be made, in the preferred embodiment, the flame effect element 52 includes apertures 68 adapted to configure light passing through the apertures 68 into an image of flames.

[0054] As can be seen in Fig. 2, in use, light from the light source 36 is reflected from the first flicker element 44 through the apertures 68 in the flame effect element 52 to the first screen 32. The path of light from the light source 36 to the flicker lement 44 and through the apertures 68 to the first screen 32 is represented in Fig. 2 by schematic paths of light 47, 48. The image of flames that results is transmitted through the first screen 32. Each of the screens 32, 38 has a front surface 67 positioned adjacent to the simulated fuel beds 34, 54 respectively, and a back surface 69, through which light from the light source 36 is transmitted into the screen 32, 38. As will be described, the front surface 67 may or may not be partially reflective, and the back surface 69 preferably diffuses light but also transmits light.

[0055] The first simulated ember bed 34, as shown in Figs. 6 and 7, preferably comprises a simulated grate 70 which is positioned above a simulated ember bed 72 and supports simulated fuel elements 74. Various arrangements can be used to achieve the desired effect. For example, the grate 70 could support the simulated ember b d 72, and the simulated fuel elements 74 could be positioned on top of the simulated ember bed 72 (not shown). In Fig. 6, simulated fuel element 74 is directly supported by the simulated grate 70 and the simulated ember bed 72 is positioned below the simulated grate 70. The second simulated fuel bed 54 also includes a simulated grate 71, a simulated ember bed 73, and simulated fuel elements 75 (Fig. 17), corresponding to similar elements in the first simulated fuel bed 34. As shown, the simulated fuel elements 74, 75

are formed and colored to simulate wood logs, however, the simulated fuel elements 74, 75 can be formed and colored to simulate any desired fuel, as is known in the art. Preferably, the simulated ember beds 72, 73 are vacuum-formed of plastic and painted and formed to simulated ember beds. In the preferred embodiment, the simulated fuel elements 74, 75 are made of styrofoam and formed and colored (i.e., painted) to simulate fuel which is burning and partially burned.

[0056] In the preferred embodiment, and as shown in Figs. 1 and 3, the screens 32, 38 each include a pattern 76 depicting a structure. U.S. patent application no. 09/968,796, filed on October 3, 2001, discloses screens including such patterns. Preferably, the structure depicted is a firebrick wall, such as that which may be seen in a real fireplace. Where the screens 32, 38 include the pattern 76, side walls 78 are preferably included. The side walls 78 also include patterns 80 which are formed, colored and positioned to mate with the patterns 76 on the screens 32, 38.

[0057] The screens 32, 38 can be glass or plastic or any material suitable for transmitting an image of flames therethrough. However, the screens 32, 38 are preferably glass, and the front surfaces 67 of either or both of screens 32, 38 can be partially silvered so that they are partially reflective, as disclosed in U.S. Patent No. 5,642,580 (Hess et al.). In addition, the back surfaces 69 of the screens 32, 38 can be adapted for diffusing the fluctuating light and transmitting the fluctuating light to the front screen 67, where the image of flames created by the fluctuating light is viewable by a viewer (not shown). To achieve this effect, a reflective region 82 of the front surface 67 which is adjacent to the simulated fuel bed 34, 54 when the flame simulating assembly 30 has been assembled is lightly silvered, so that the simulated fuel bed 34, 54 is partially reflected in the reflective region 82, giving the illusion of depth. However, the image of flames is also partially observable by the viewer in the reflective region 82.

[0058] As can be seen in Figs. 1 and 3, where the screen 32, 38 includes the pattern 76, it is preferred that the pattern extends only partly into the reflective region 82.

It has been determined that the pattern 76 should not extend far into the reflective region 82 because the pattern 76 otherwise tends to distract the viewer from the image of flames, so that the simulation of flames is then somewhat less effective.

[0059] The back surface 69 can be treated in any suitable manner, such as scoring, or covering the back surface 69 with a thin coating of transparent ink, to achieve the desired effect, i.e., of a certain amount of diffusion, together with some light being transmitted into the screen 32, 38. Preferably, the back surface 69 is non-planar, so that the image of flames transmitted through the back surface 69 appears to the viewer to be three-dimensional. In the preferred embodiment, a diffusing member 84 is created out of translucent frosted plastic, which is non-planar. The diffusing member 84 is similar to the diffusing member disclosed in U.S. Patent No. 6,363,636 (Hess et al.). The diffusing member 84 can be used with either or both of screens 32, 38 to provide a three-dimensional image of flames transmitted through the screens 32, 38. For example, as shown in Figs. 8 and 9, the diffusing member 84 is positioned behind the first screen 32. The second screen 38 is not shown in Figs. 8 and 9 in order to simplify the drawings.

[0060] It will also be appreciated that the screens 32, 38 may have front surfaces 67 which are not reflective and may or may not have back surfaces 69 which diffuse the light from the light source 36 as it passes through the back surfaces. However, if it is desired to have a reflective front surface on the screen 32, 38, then it is also advantageous to have a non-reflective matte region 90 (Fig. 19), positioned so that objects in the room to which the screen 32, 38 is positioned may not be reflected in the screen 32, 38, as disclosed in U.S. Patent No. 6,269,567 (Hess et al.). In practice, due to the position of most viewers' eyes relative to the screen 32, 38, the non-reflective matte region 90 is positioned distal from the simulated fuel bed 34, 54, i.e., from the reflective region 82 of the front surface 67. Preferably, a transition region 92 (Fig. 19) is positioned between the non-reflective matte region 90 and the reflective region 82.

[0061] As noted, both simulated fuel beds 34, 54 have not been shown in Figs. 2 and 4 - 9 so that the drawings may be simplified. The flame simulating assembly 30 is shown in Figs. 20 and 21 including the preferred embodiment of two simulated fuel beds 34, 54 in position.

[0062] Additional embodiments of the invention are shown in Figs. 10 - 18 and 22 - 25. In Figs. 10 - 18 and 22 - 25, elements are numbered so as to correspond to like elements shown in Figs. 1 - 9 and 19 - 21.

[0063] An alternative embodiment is shown in Figs. 10 - 11, in which a flame simulating assembly 130 includes a flame effect element 152 with reflective portions 94 for configuring the light from the light source 36 so that an image of flames is created. As can be seen in Fig. 11, in the flame simulating assembly 130, a first flicker element 144 is positioned below the first simulated fuel bed 34, and light from the light source is caused to fluctuate by the first flicker element 144, and reflected from the first flicker element 144 to a first side 96 of the flame effect element 152. The fluctuating light is further reflected by the reflective portions 94 on the first side 96 to the back surface 69 of the first screen 32, to provide an image of flames transmitted through the first screen 32. The path of light is represented by schematic paths of light 97, 98, and 99 in Fig. 11.

[0064] Fig. 10 shows a second side 100 of the flame effect element 152, with reflective portions 94 thereon, and showing a second flicker element 146. It will be understood that the flame simulating assembly 130 preferably includes both simulated fuel b ds 34, 54, and that the second simulated fuel bed 54 is not shown in Figs. 10 and 11 for clarity in the drawings.

[0065] Another alternative embodiment is shown in Figs. 12 - 14, in which a flame simulating assembly 230 can be seen which includes a flicker element 244 and a flame effect element 252. Except for its position above the light source 36 (see Fig. 10), the flicker element 244 is preferably a rotisserie type of flicker element, like flicker elements

44 or 46. The flame effect element 252 includes apertures 268 (Figs. 13, 14) for configuring light from the light source 36 to provide an imag of flames, but th flame effect element 252 also includes reflective portions 298 (Fig. 13) on a second side 200 of the flame effect element 252 which also configure light from the light source 36 to provide an image of flames. Preferably, and as shown in Fig. 14, a first side 296 of the flame effect element 252 does not include reflective portions 298.

[0066] As can be seen in Fig. 12, light from the light source 36 is reflected by the reflective portions 298 to the back 69 of the second screen 38. The path of light from the light source 36 to the second screen 38 is represented by schematic paths of light 201, 202, and 203 (Fig. 12). Light from the light source 36 is transmitted through the apertures 268 to the back surface 69 of the first screen 32. The path of light from the light source 36 to the first screen 32 is represented in Fig. 12 by schematic paths of light 204, 205.

[0067] Another embodiment, a flame simulating assembly 330, is shown in Figs. 15 - 18. As shown in Figs. 15 and 16, the flame simulating assembly 330 includes screens 332, 338, and each of the screens 332, 338 has a front surface 367 with a reflective portion 382, a non-reflective portion 308, and a top portion 310 through which the viewer can relatively easily see. A front view of the screen 338 is shown in Fig. 18.

[0068] The flame simulating assembly 330 is intended to simulate a real two-sided fireplace (not shown), in which a viewer 312 (Fig. 16), if viewing the fire in the real fireplace from a position relative to the fireplace to enable the viewer 312 to do so, will be able to see through the fireplace, i.e., above the flames of the fire, into the next room (not shown), i.e., the room from which the first screen 332 can be observed. As can best be seen in Fig. 16, the viewer 312 can see through the top region 310 of the second screen 338 and also through the top region 310 of the first screen 332. A schematic path of light 313 in Fig. 16 represents the line of sight of the viewer 312 through the top regions 310 in each of the screens 332 and 338. Preferably, a shield 317 is positioned between the screens 332, 338 at a height just below the top regions 310, as can be seen in Fig. 16.

The shield 317 is intended to prevent possible distractions between screens 332 and 338 from entering the viewer's field of vision. The shield 317 is preferably made of dark (preferably black) material, for example, black cloth placed on a frame. As can be seen in Fig. 16, the viewer 312 also can observe the image of flames transmitted through the second screen 338 simultaneously.

[0069] It will be appreciated that various arrangements are possible which may provide satisfactory results, depending on the effects sought to be simulated and cost considerations. For example, the screens 332, 338 could have regions on the front surfaces 67 positioned adjacent to the simulated fuel beds 34, 54 which are not necessarily reflective, or partially reflective. Similarly, the screens 332, 338 could have only the reflective regions 382 and the top portions 310, i.e., the screens 332, 338 could be constructed without the non-reflective regions 308. Also, although the top portions 310 are preferably transparent, they could be translucent.

[0070] An alternative embodiment of the screens 332, 338 is shown in Fig. 18. As can be seen in Fig. 18, the screen 332, 338 is positioned within the flame simulating assembly body 356. The body 356 (including screen frames (not shown)) maintains the screens 332, 338 in substantially upright positions. Each of the first screen 332 and the second screen 338, however, includes a top edge 320 distal from the first simulated fuel bed 34 and the second simulated fuel bed 54 respectively. The top edges 320 of the screens 332, 338 are spaced apart from an upper portion 322 of the body to define an opening 324 which is formed through the flame simulating assembly 330. The opening 324 enables the viewer to see through the opening. For example, the viewer positioned in a room for viewing the second screen 338 can see through the opening 316 into a second room from which the first screen 332 can be observed.

[0071] Another embodiment, being a flame simulating assembly 430, is shown in Fig 22. In this embodiment, there are no simulated fuel beds. The images of flames are transmitted through the screens 432, 438, and result from light from the light

source 36 which has been caused to fluctuate by the flicker elements 44, 46 and then configured into an image of flames by the flame effect element 52. Although the screens 432, 438 transmit images of flames, the screens 432, 438 ar formed and colored so as to provide images which simulate flames, however, without the simulated fuel beds 34, 54.

[0072] Yet another embodiment, being a flame simulating assembly 530, is shown in Fig. 23. In this embodiment, the flame simulating assembly 530 includes screens 532, 538, a light source 36, and flicker elements 544, 546. The flame simulating assembly 530 does not include a flame effect element.

[0073] In another embodiment, a flame simulating assembly 630 shown in Figs. 24 and 25, a light source 636 is positioned inside a flicker element 614. In the flame simulating assembly 630, the flicker element 614 is a "drum" type of flicker element. In this type of flicker element, a cylindrical body 615 includes a plurality of flame-shaped apertures 616. Preferably, the body 615 is adapted to rotate about the light source 636, which is positioned inside the body 615. The light source 636 is stationary, and the body 615 is rotated by an electric motor (not shown). Light from the light source 636 is configured by the apertures 616 to provide an image of flames which is transmitted to the back surfaces 69 of the screens 632, 638. Because the body 615 preferably rotates about the light source 636, the images of flames which are generated by the flicker element 614 and the light source 636 fluctuate, to simulate flames.

[0074] In Fig. 23, the flame simulating assembly 630 is shown without simulated fuel beds, as the flame simulating assembly 630 may be constructed in this way. Preferably, however, the flame simulating assembly 630 includes simulated fuel beds 34, 54, as shown in Fig. 25.

[0075] The flame simulating assembly 30 also can include front reflectors (not shown) for reflecting light from the light source 36 onto the simulated fuel bed. Such front

reflectors are described in U.S. patent applications numbers 09/649,043 and 09/837,434, each specification of which application is herein incorporated by a reference. The front reflectors provide a more realistic simulation of hot burning embers in the simulated fuel bed.

[0076] The above-described embodiments of the present invention are intended to be examples only. Alterations, modifications and variations may be effected to the embodiments described above by those skilled in the art without departing from the scope of the invention, which is defined solely by the claims appended hereto.

WE CLAIM:

1. A flame simulating assembly having:

   at least one light source operable to produce a plurality of images of flames;

   a first screen adapted to transmit light from said at least one light source to produce a first image of flames appearing through the first screen; and

   a second screen adapted to transmit a second image of flames appearing through the second screen.

2. A flame simulating assembly according to claim 1 in which the first screen and the second screen are positioned opposite each other.

3. A flame simulating assembly according to claim 1 in which the first screen and the second screen define substantially vertical planes respectively and said at least one light source is positioned between said planes.

4. A flame simulating assembly according to claim 1 additionally including at least one flicker element for creating a fluctuating light, said at least one flicker element being positioned in a path of light from said at least one light source to a screen selected from the group consisting of the first screen and the second screen, whereby the fluctuating light is transmitted through said screen to produce an image of flames appearing through said screen.

5. A flame simulating assembly according to claim 1 additionally including at least one flame effect element for configuring light from the light source to simulate flames, said at least one flame effect element being positioned in a first path of light between said at least one light source and the first screen and in a second path of light between said at least one light source and the second screen, whereby light from said at least one light source is configured by said at least one flame effect element to simulate flames and transmitted through the first screen and the second screen to produce the first image and the second image of flames respectively.

6. A flame simulating assembly according to claim 1 additionally including a first flicker element for creating a fluctuating light to produce a first image of flames, the first flicker element being positioned in a first path of light between said at least one light source and the first screen, and a second flicker element for creating a fluctuating light to produce a second image of flames, the second flicker element being positioned in a second path of light between said at least one light source and the second screen.

7. A flame simulating assembly according to claim 6 additionally including at least one flame effect element for configuring the fluctuating light to simulate flames, said at least one flame effect element being positioned in the paths of the fluctuating light, whereby the fluctuating light is configured to simulate flames and transmitted through the first screen and the second screen to produce the first image of flames and the second image of flames appearing through the first screen and the second screen respectively.

8. A flame simulating assembly according to claim 1 additionally including at least one simulated fuel bed positioned adjacent to a screen selected from the group consisting of the first screen and the second screen such that said image of flames transmitted through said screen appears above said at least one simulated fuel bed.

9. A flame simulating assembly according to claim 1 additionally including a first simulated fuel bed and a second simulated fuel bed positioned adjacent to the first screen and the second screen respectively such that the first image of flames and the second image of flames appear above the first simulated fuel bed and the second simulated fuel bed respectively.

10. A flame simulating assembly having:

a first simulated fuel bed;

a second simulated fuel bed;

at least one light source operable to produce a plurality of images of flames;

a first screen positioned behind the first simulated fuel bed for transmitting light from said at least one light source to produce a first image of flames appearing through the first screen above the first simulated fuel bed; and

a second screen positioned behind the second simulated fuel bed for transmitting light from said at least one light source to produce a second image of flames appearing through the second screen above the second simulated fuel bed.

11. A flame simulating assembly according to claim 10 additionally including at least one flicker element for creating a fluctuating light, said at least one flicker element being positioned in a path of light from said at least one light source to the first screen and the second screen, whereby the fluctuating light is transmitted through said screens to produce images of flames appearing through said screens.

12. A flame simulating assembly according to claim 10 additionally including at least one flicker element for creating a fluctuating light, said at least one flicker element being positioned in a path of light from said at least one light source to a screen selected from the group consisting of the first screen and the second screen, whereby the fluctuating light is transmitted through said screen to produce an image of flames appearing through said screen.

13. A flame simulating assembly according to claim 10 additionally including at least one flame effect element for configuring light from said at least one light source to simulate flames, said at least one flame effect element being positioned in a first path of light between said at least one light source and the first screen and in a second path of light between said at least one light source and the second screen, whereby light from said at least one light source is configured to simulate flames and transmitted through the first screen and the second screen to produce the first

image of flames and the second image of flames appearing through the first screen and the second screen respectively.

14. A flame simulating assembly according to claim 10 additionally including a first flicker element for creating a fluctuating light to produce a first image of flames, the first flicker element being positioned in a first path of light between said at least one light source and the first screen, and a second flicker element for creating a fluctuating light to produce a second image of flames, the second flicker element being positioned in a second path of light between said at least one light source and the second screen.

15. A flame simulating assembly according to claim 14 additionally including at least one flame effect element for configuring the fluctuating light to simulate flames, said at least one flame effect element being positioned in the paths of the fluctuating light between said at least one light source and the first screen and the second screen, whereby the fluctuating light is configured to simulate flames and transmitted through the first screen and the second screen to produce the first image of flames and the second image of flames appearing through the first screen and the second screen respectively.

16. A flame simulating assembly according to claim 15 in which said at least one flame effect element includes at least one aperture positioned to permit light from said at least one light source to pass through said at least one aperture to said second screen and at least one reflective region for reflecting light from said at least one light source to said first screen.

17. A flame simulating assembly according to claim 15 in which at least one of said screens includes a pattern for simulating a firebrick wall to a viewer of the image of flames transmitted through said at least one screen.

18. A flame simulating assembly according to claim 15 in which each of the first screen and th second screen includes:
a partially reflective front surface positioned behind the first simulated fuel bed and the second simulated fuel bed respectively; and
a back surface for diffusing the fluctuating light and transmitting the fluctuating light to the front surface.

19. A flame simulating assembly according to claim 18 in which each of the partially reflective front surfaces has a substantially non-reflective matte region, each said non-reflective matte region being disposed distal from the first simulated fuel bed and the second simulated fuel bed respectively, each of the screens having a portion of the front surface being a generally reflective region, such that the first simulated fuel bed and the second simulated fuel bed are substantially the only objects reflected in the reflective regions respectively, wherein fluctuating light is transmitted through the front surfaces to produce respective images of flames.

20. A flame simulating assembly according to claim 19 in which each said front surface further includes a transition region which is partially reflective and partially non-reflective, each said transition region being positioned between each said non-reflective matte region and each said reflective region in each said screen respectively.

21. A flame simulating assembly according to claim 15 in which said at least one flame effect element includes at least one aperture for configuring light from the light source to simulate flames.

22. A flame simulating assembly according to claim 15 in which said at least one flame effect element includes a first side disposed adjacent the first screen and a second side disposed adjacent the second screen, the second side being disposed opposite the first side, and in which each of the first and second sides includes a

reflective portion for reflecting light from said at least one light source to the first scre n and the second screen respectively to produce images of flames.

23. A flame simulating assembly according to claim 18 in which at least one of the back surfaces of the first screen and the second screen is non-planar such that the image of flames transmitted through said at least one back surface appears to be three-dimensional.

24. A flame simulating assembly according to claim 10 additionally including at least one reflector positioned in front of at least one of the first simulated fuel bed and the second simulated fuel bed, said at least one reflector being positioned to reflect light from said at least one simulated fuel bed to simulate glowing embers.

25. A flame simulating assembly according to claim 10 in which each of the first screen and the second screen includes a top region positioned distal from the first simulated fuel bed and the second simulated fuel bed respectively, the top regions being adapted to permit a viewer to see through the top regions.

26. A flame simulating assembly according to claim 25 in which each of the top regions is substantially transparent.

27. A flame simulating assembly according to claim 25 in which each of the top regions is substantially translucent.

28. A flame simulating assembly according to claim 10 in which each of the first screen and the second screen is positioned within a body to maintain the screens in substantially upright positions, and each of the first screen and the second screen includes a top edge distal from the first simulated fuel bed and the second simulated fuel bed respectively, the top edges of the screens being spaced apart from an

upper portion of the body to define an opening formed through the flame simulating assembly such that a viewer can see through the opening.

29. A flame simulating assembly having:

a first simulated fuel bed;

a second simulated fuel bed;

at least one light source;

at least one flicker element positioned in a path of light from the light source, for creating a fluctuating light;

a first screen positioned behind the first simulated fuel bed for transmitting the fluctuating light; and

a second screen positioned behind the second simulated fuel bed for transmitting the fluctuating light,

whereby the fluctuating light is transmitted through the first screen and the second screen to simulate flames appearing above the first simulated fuel bed and the second simulated fuel bed respectively.

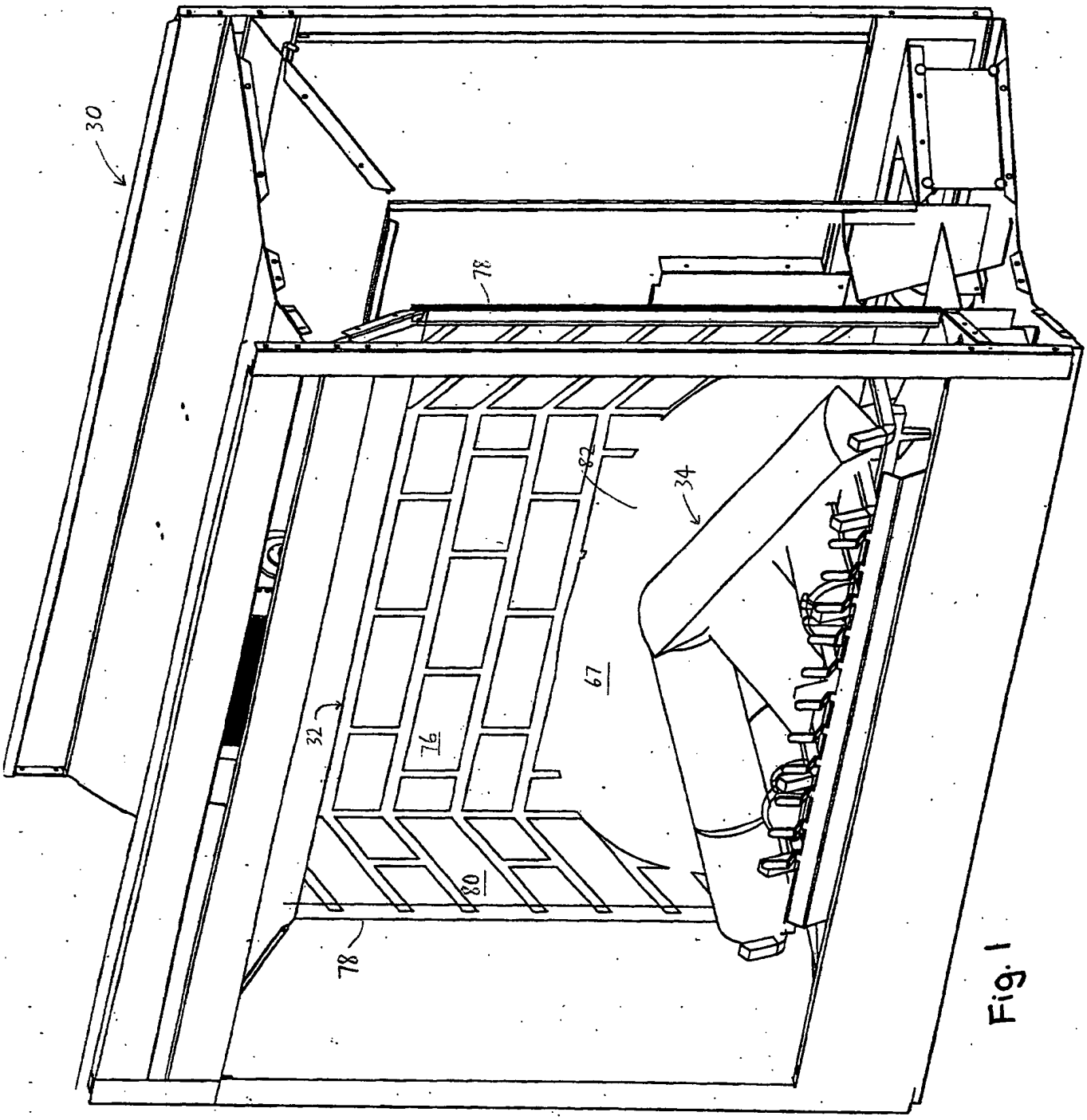

Fig. 1

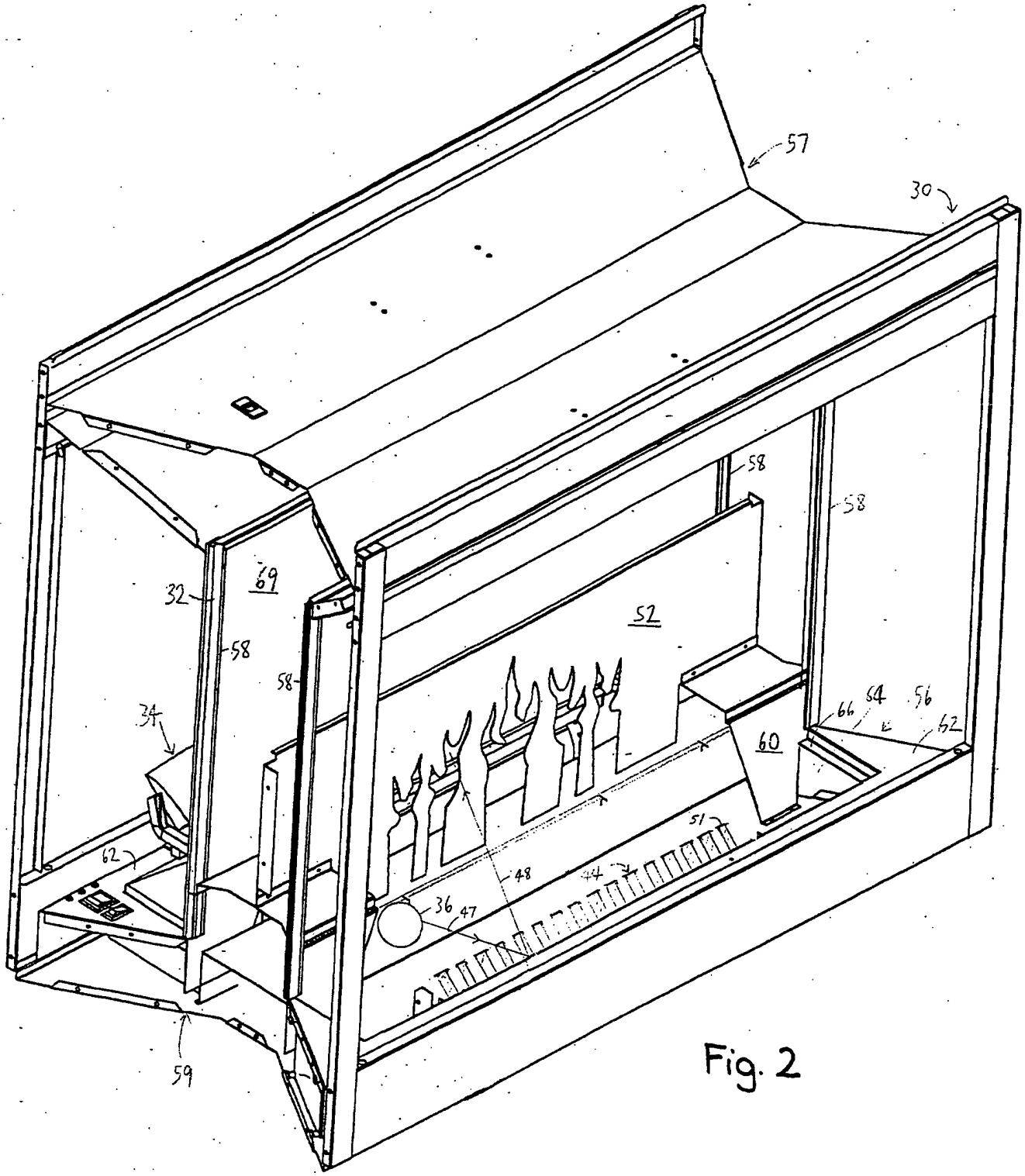

Fig. 2

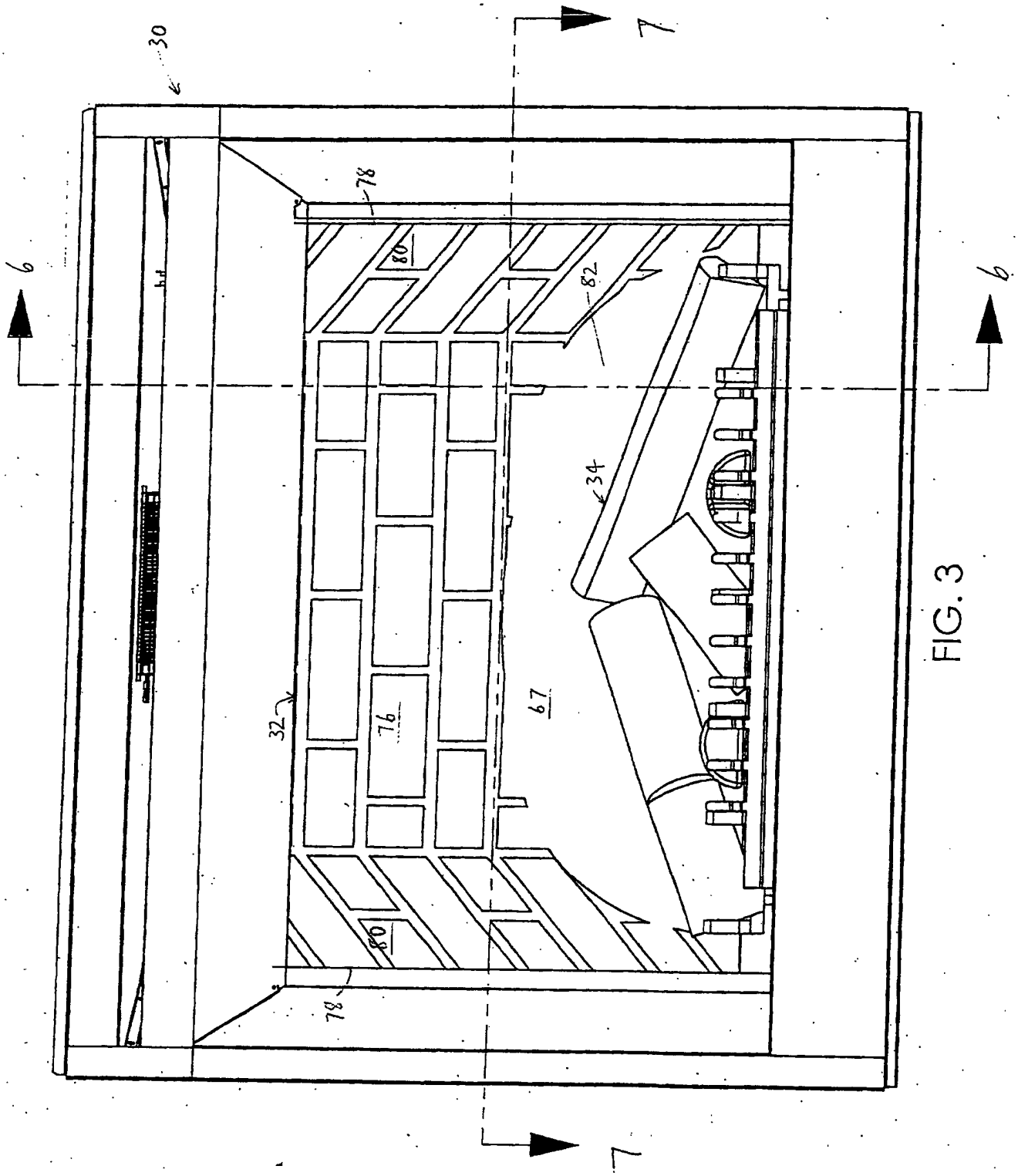

FIG. 3

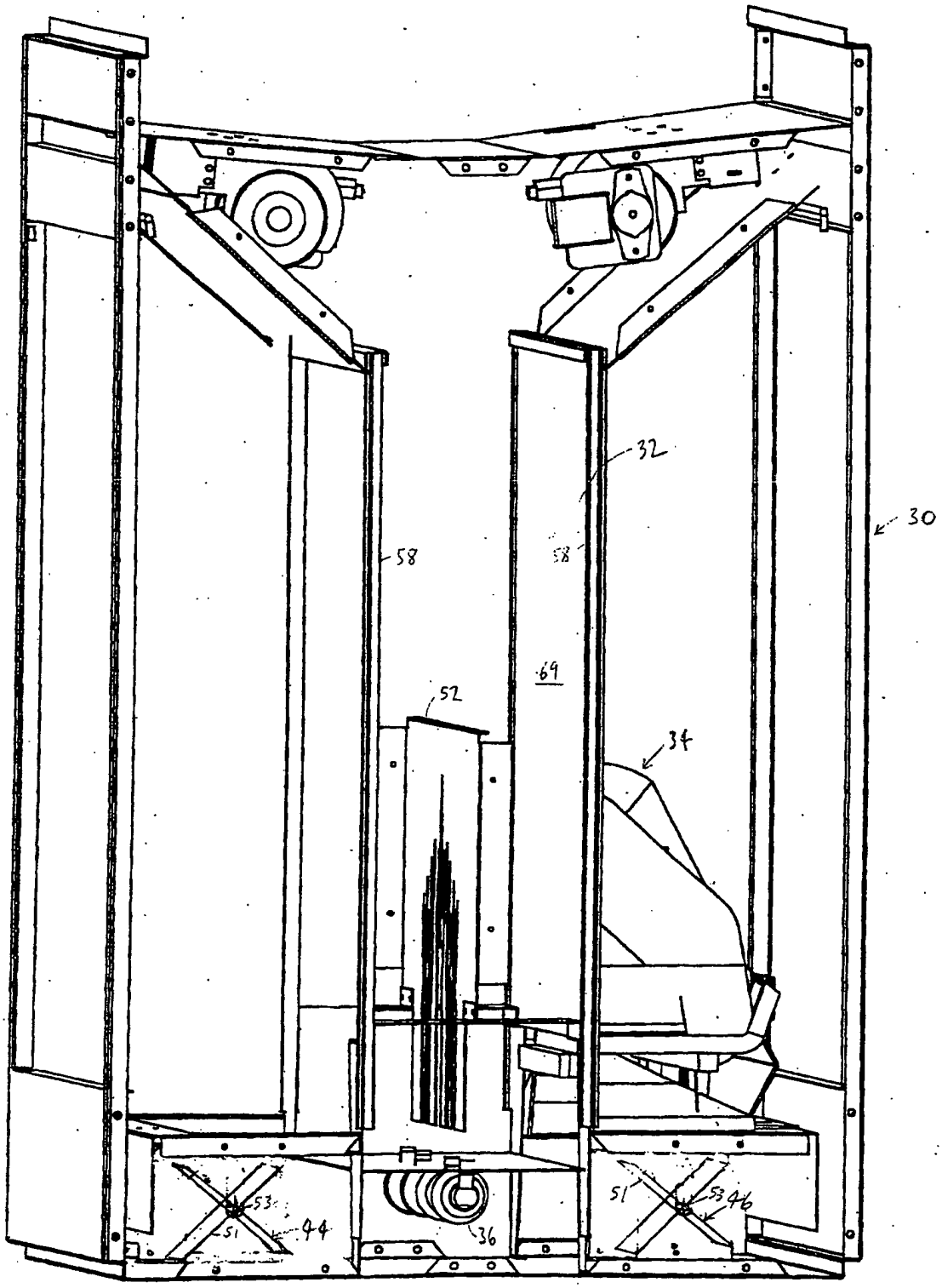

FIG.4

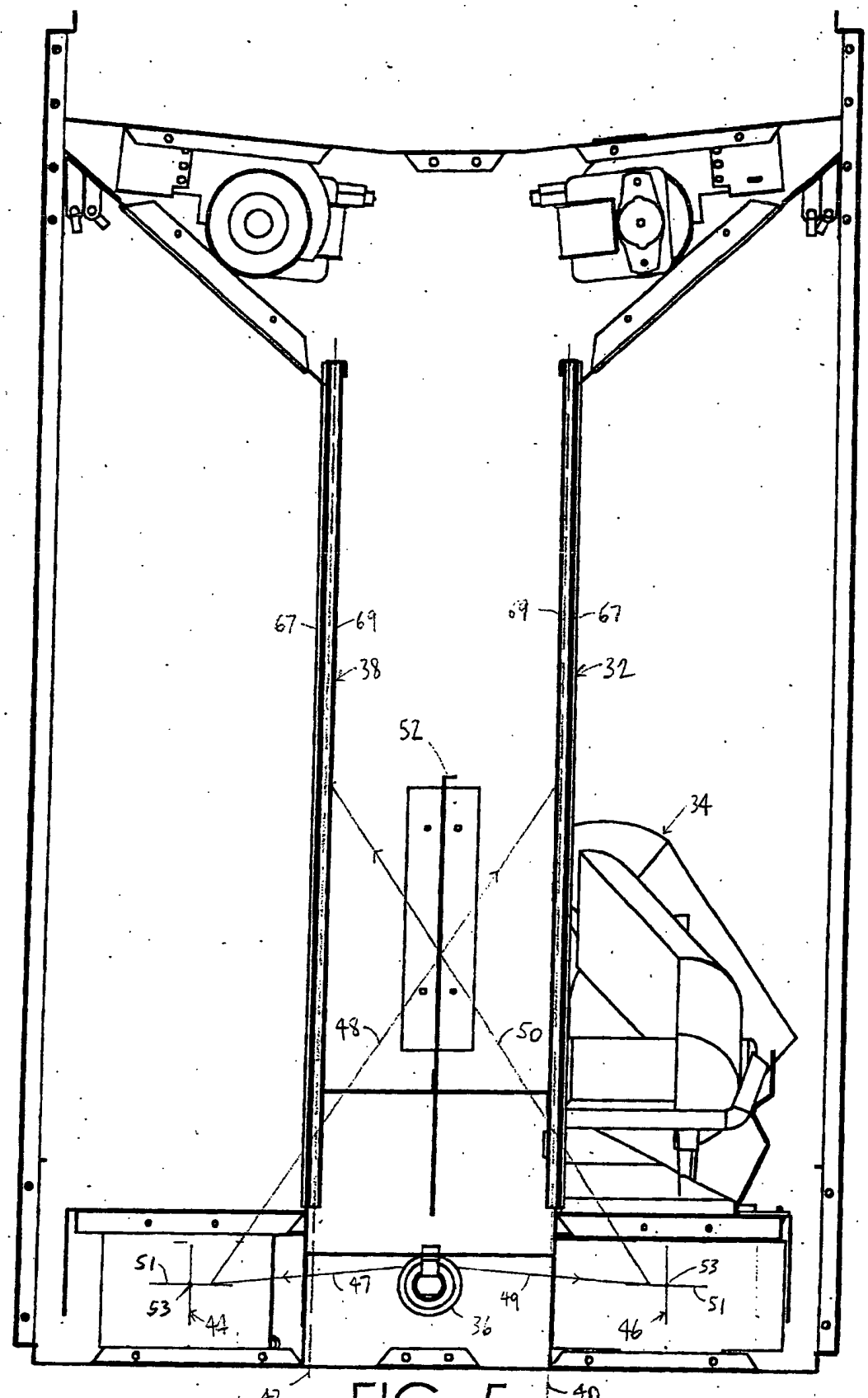

FIG. 5

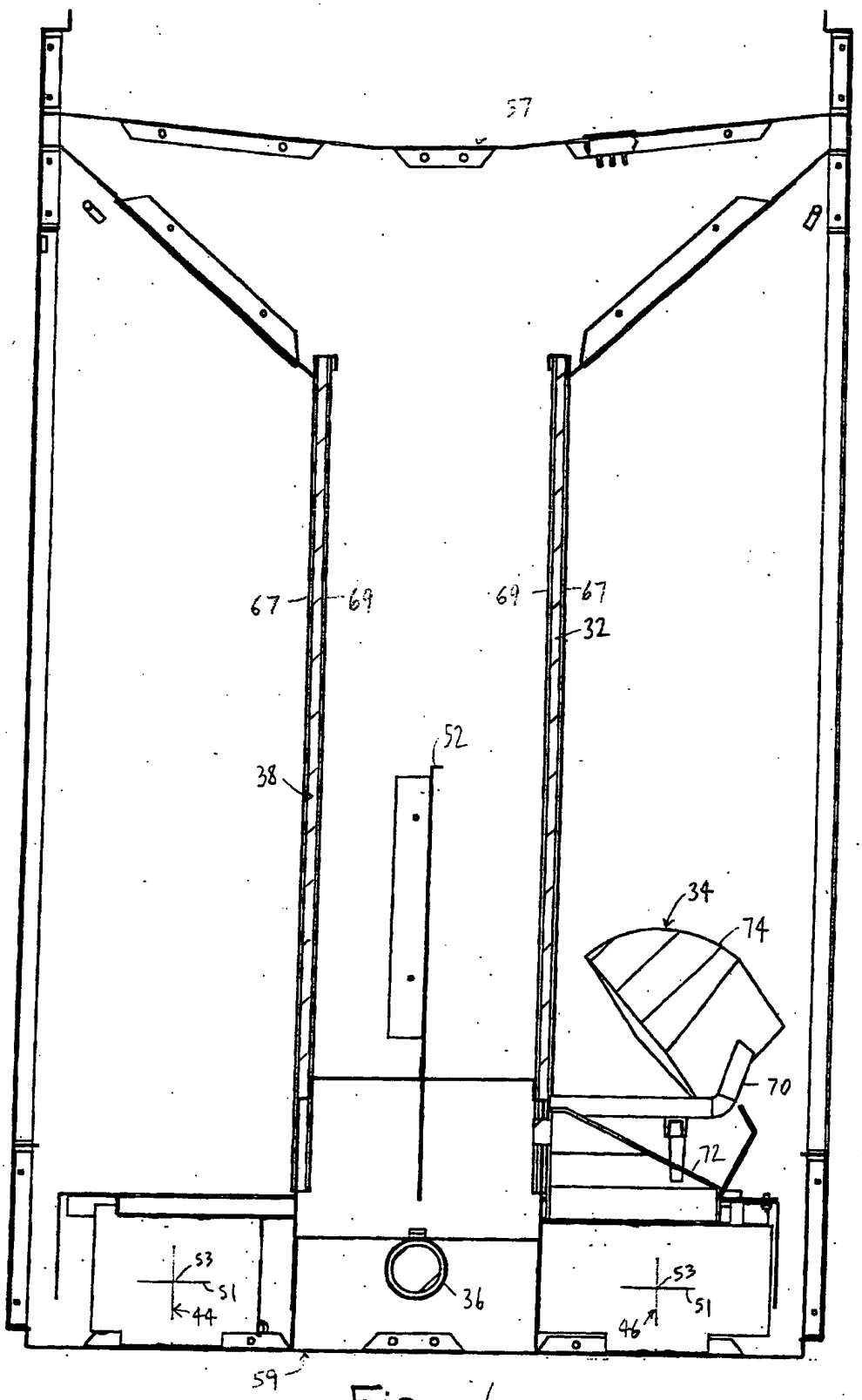

Fig. 6

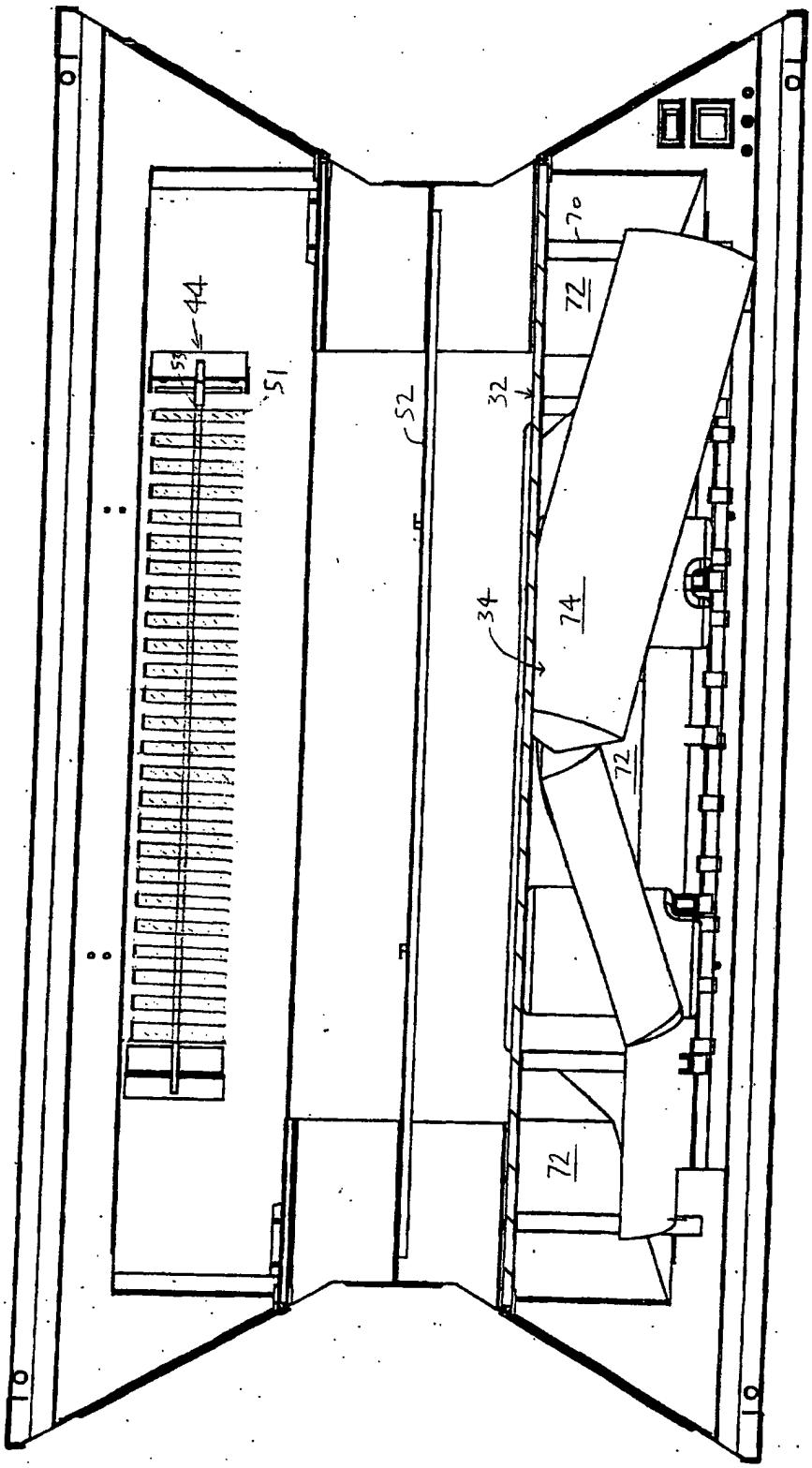

Fig. 7

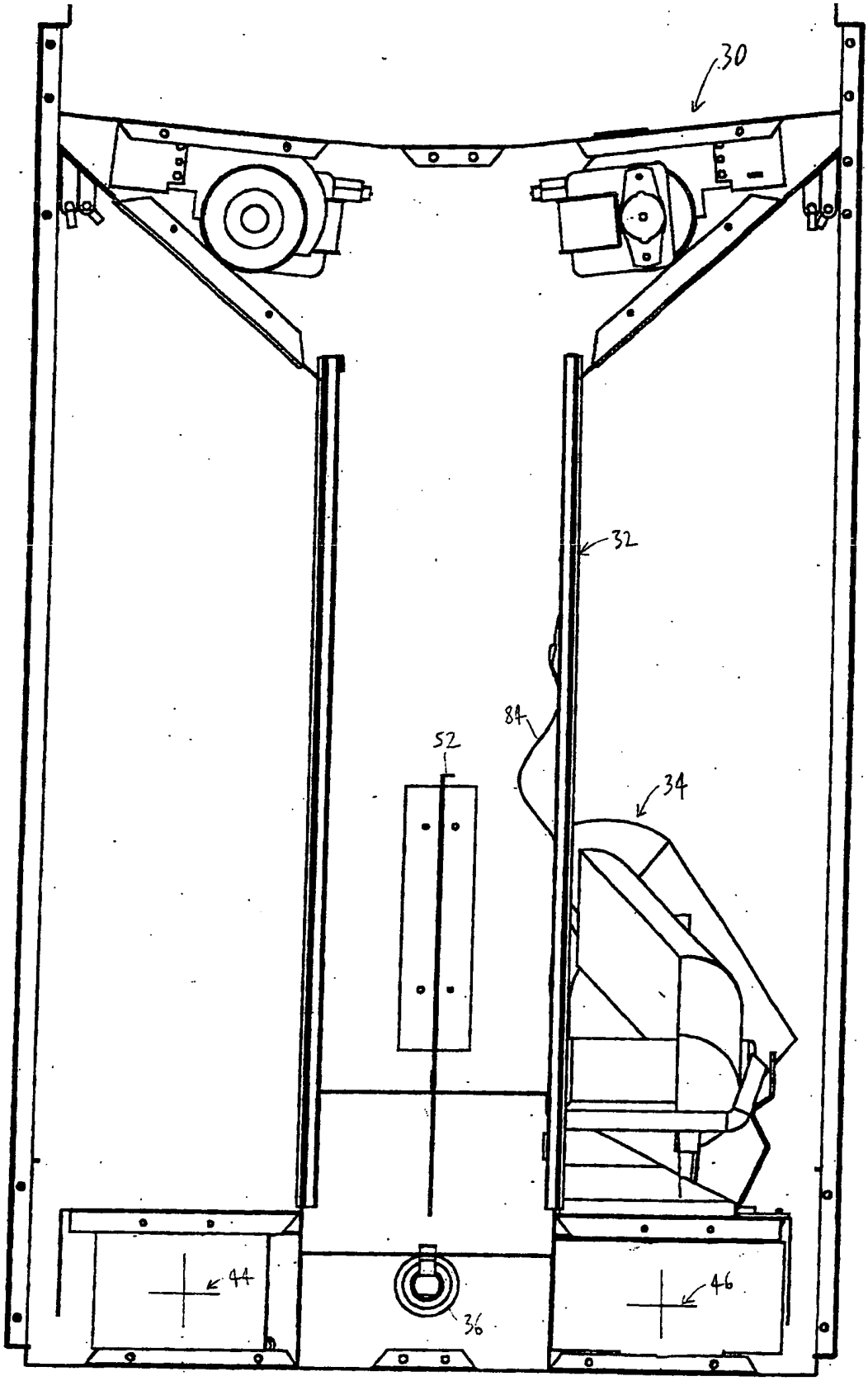

Fig. 8

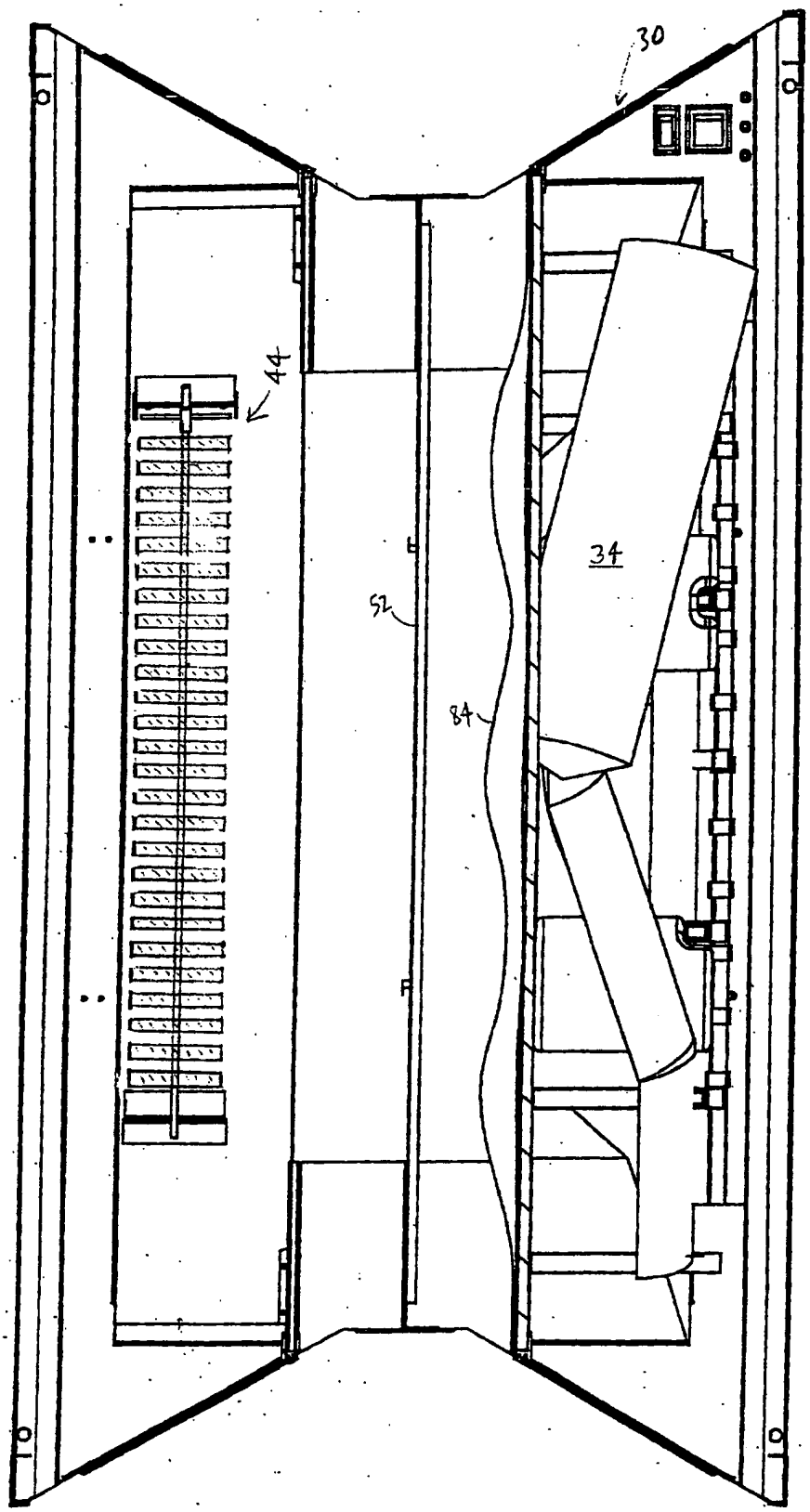

Fig. 9

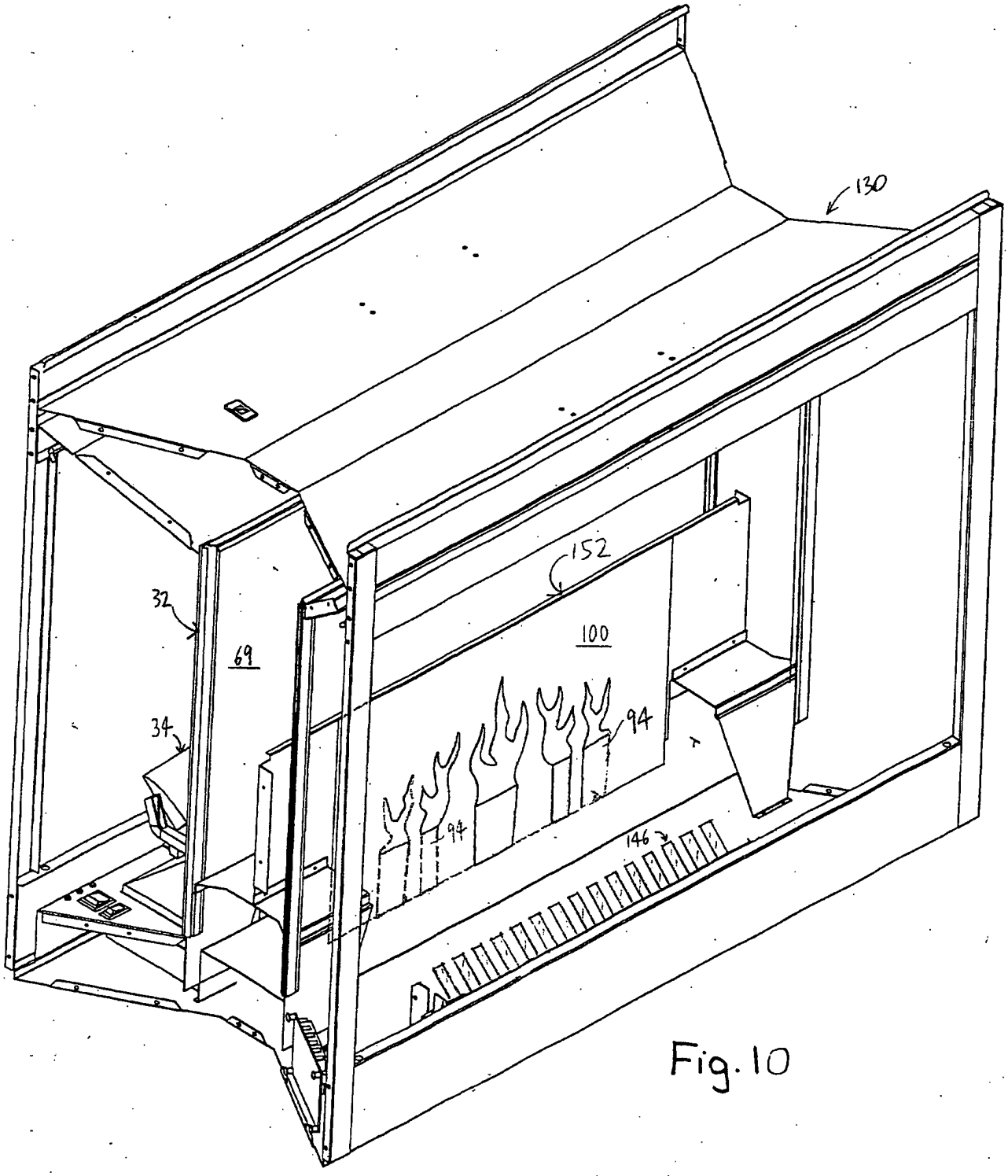

Fig. 10

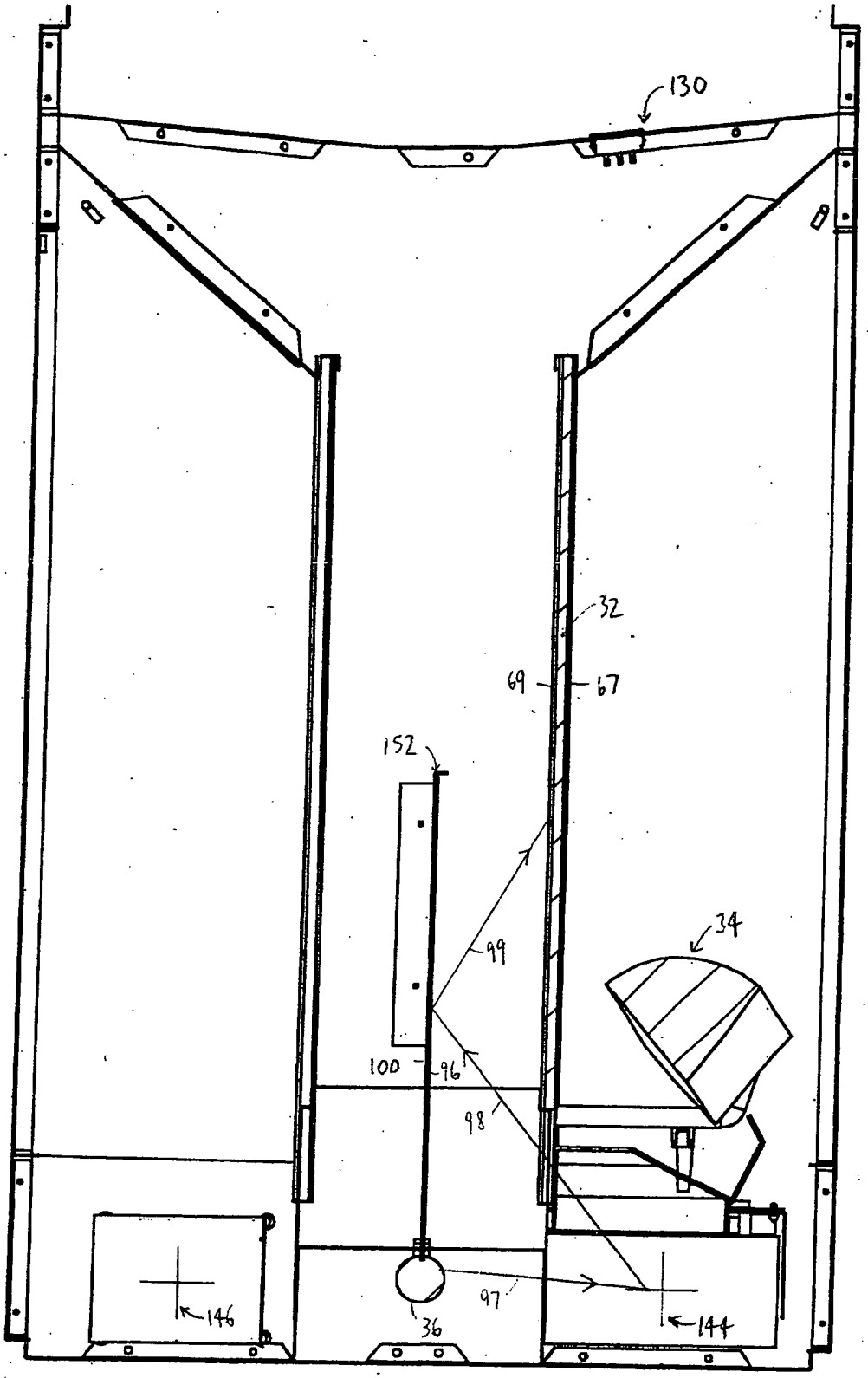

Fig.11

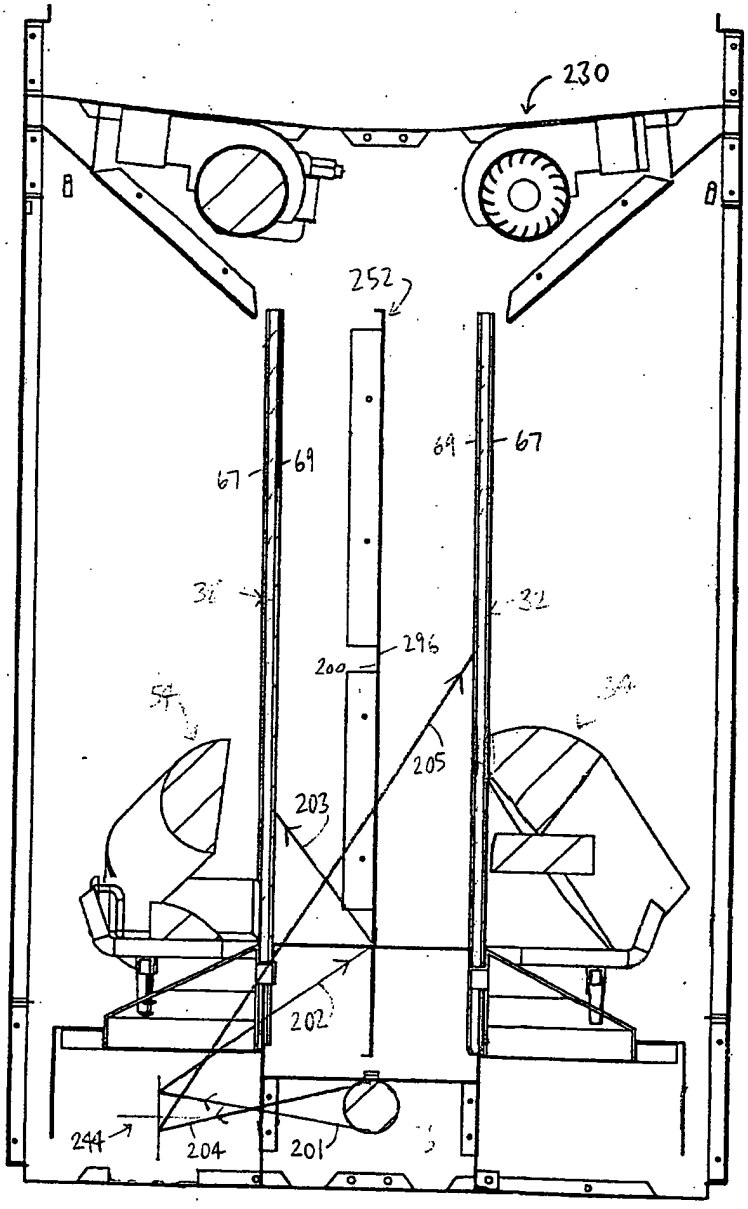

Fig. 12

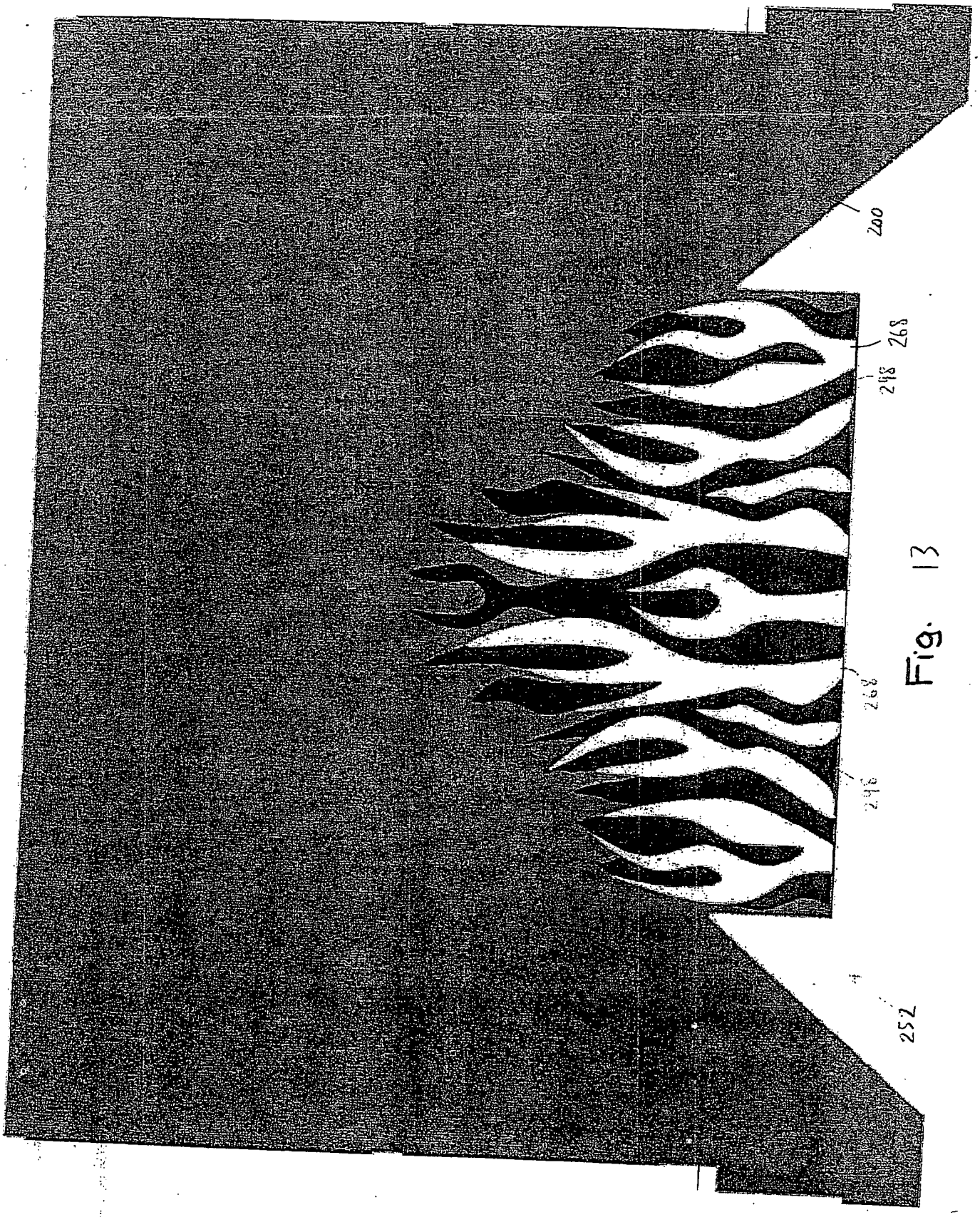

Fig. 13

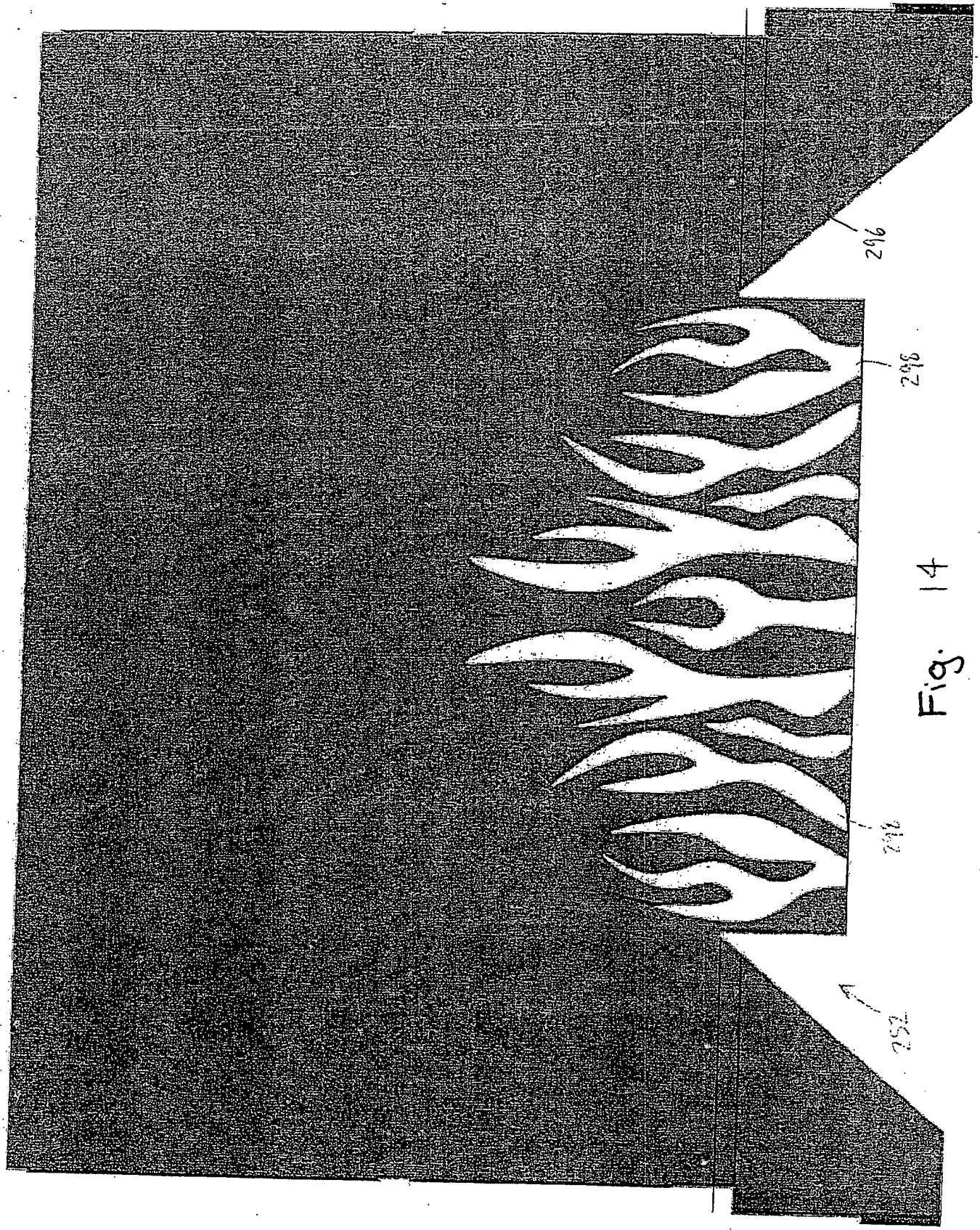

Fig. 14

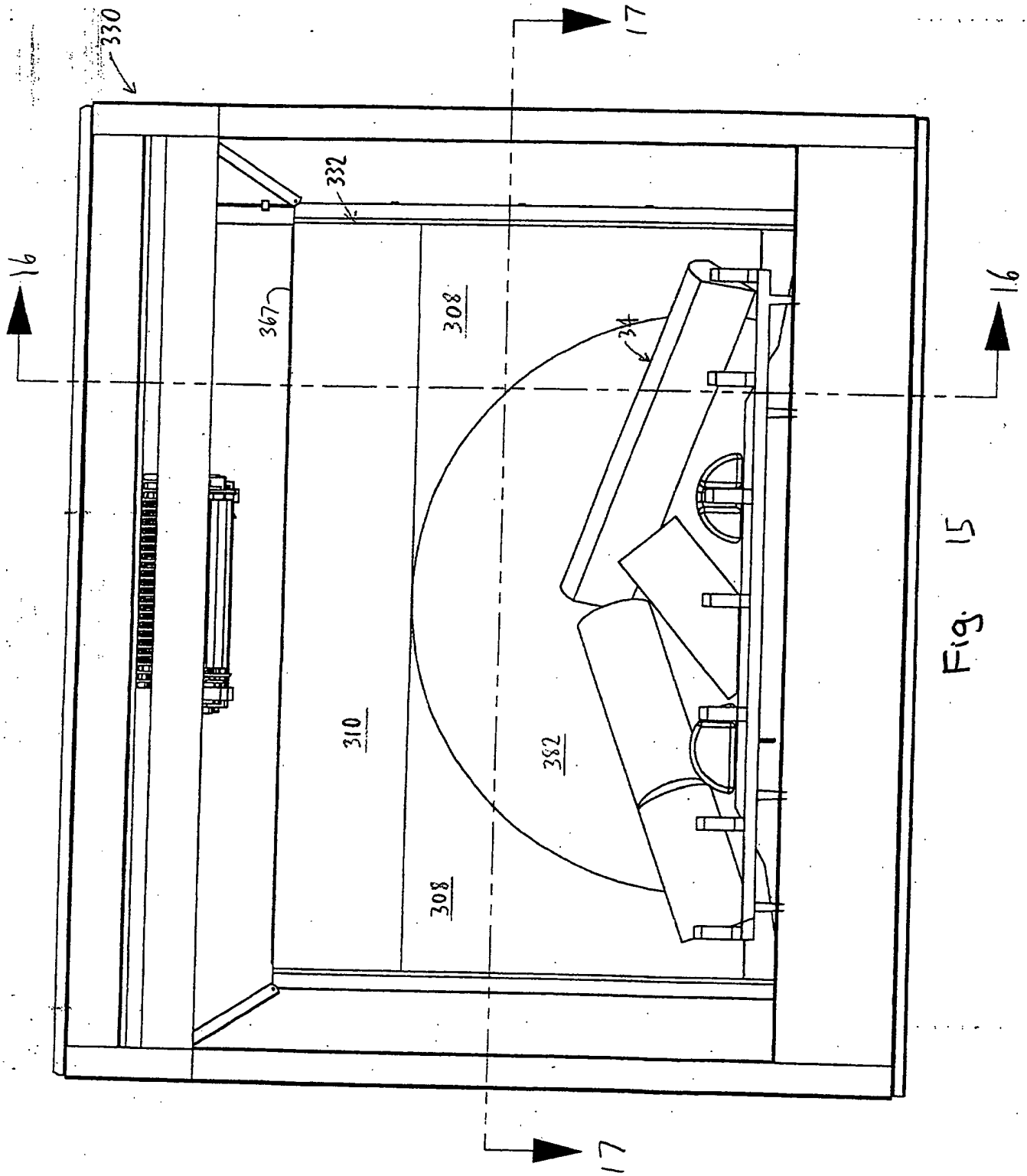

Fig. 15

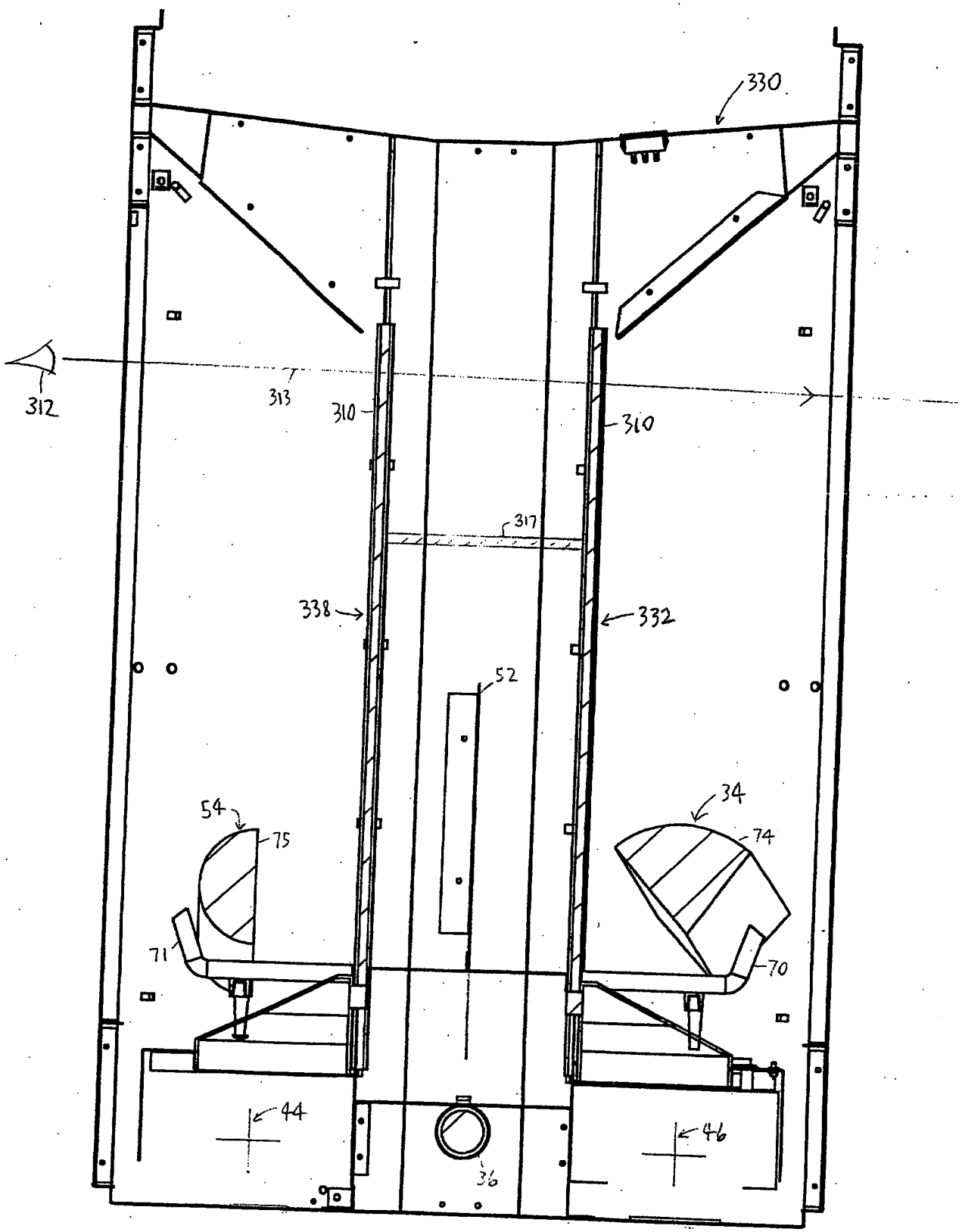

Fig. 16

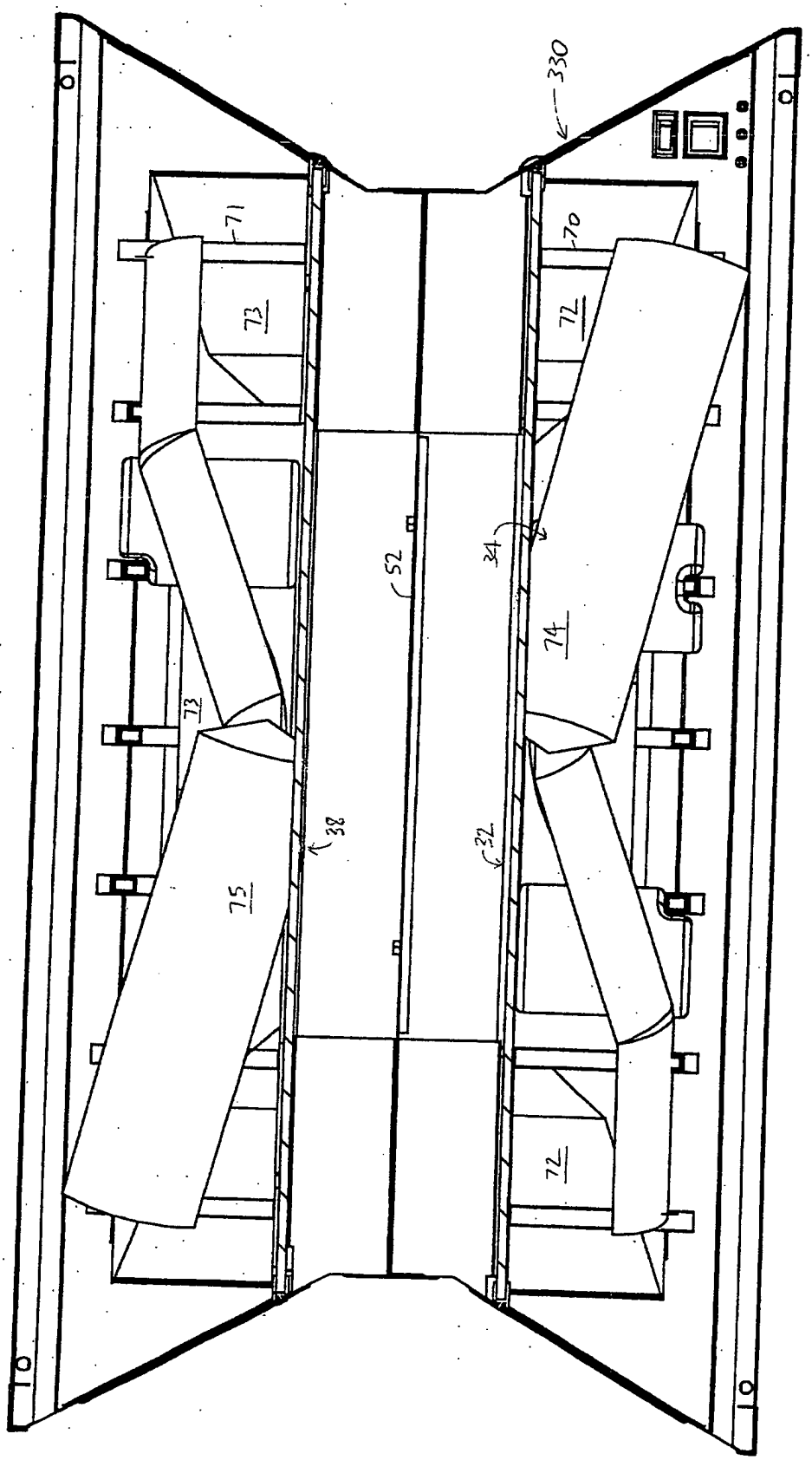

Fig. 17

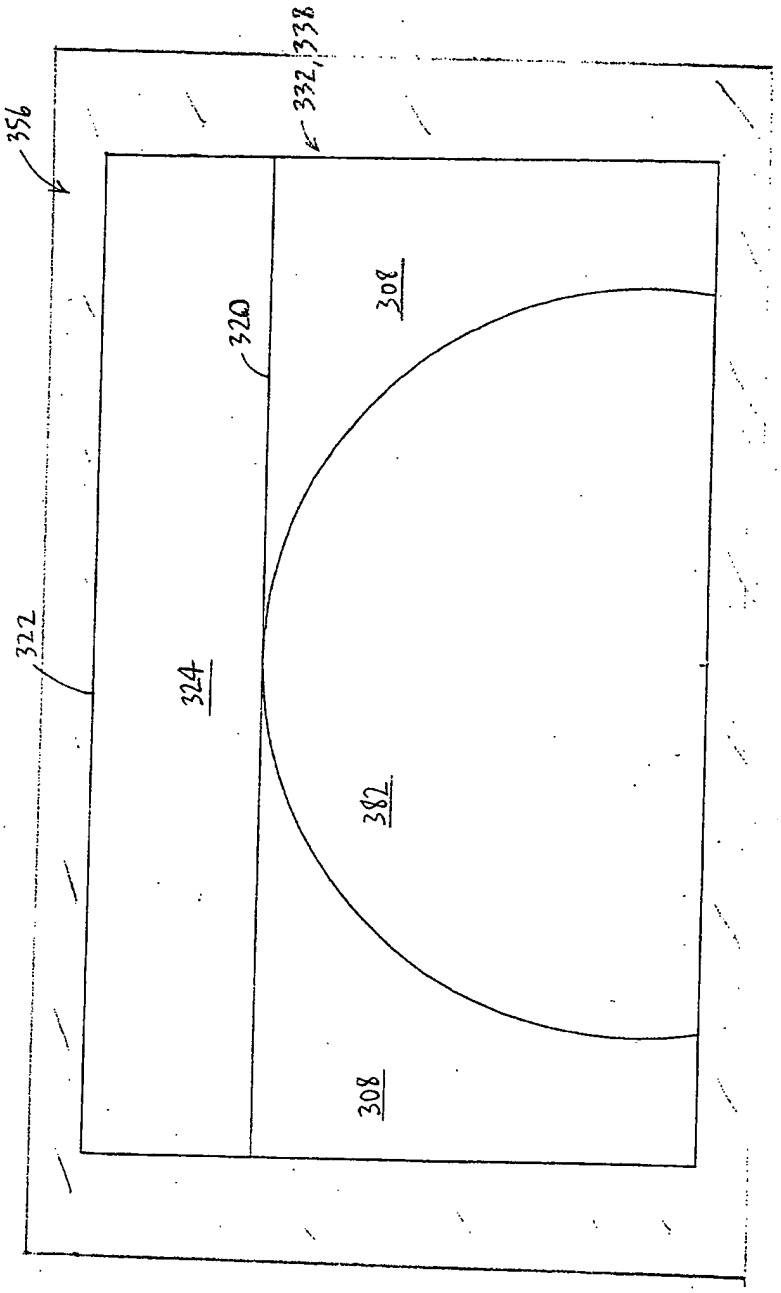

Fig. 18

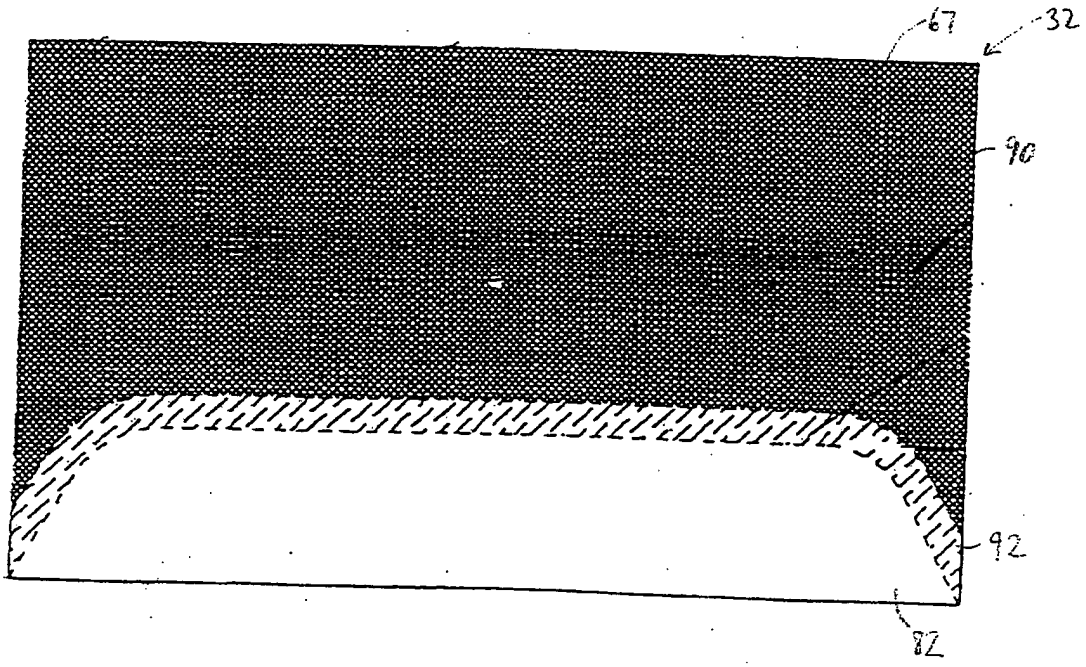

Fig. 19

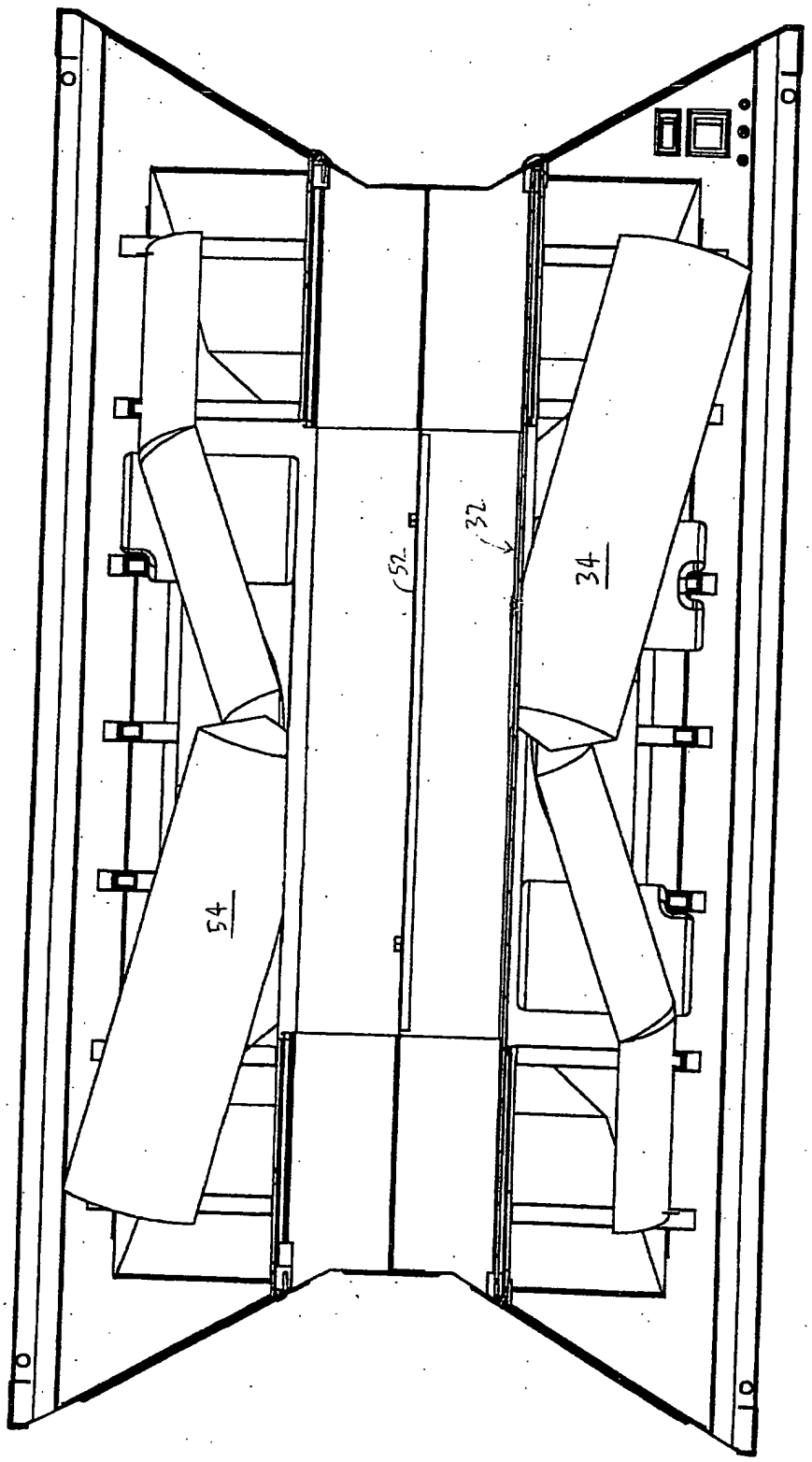

Fig. 2D

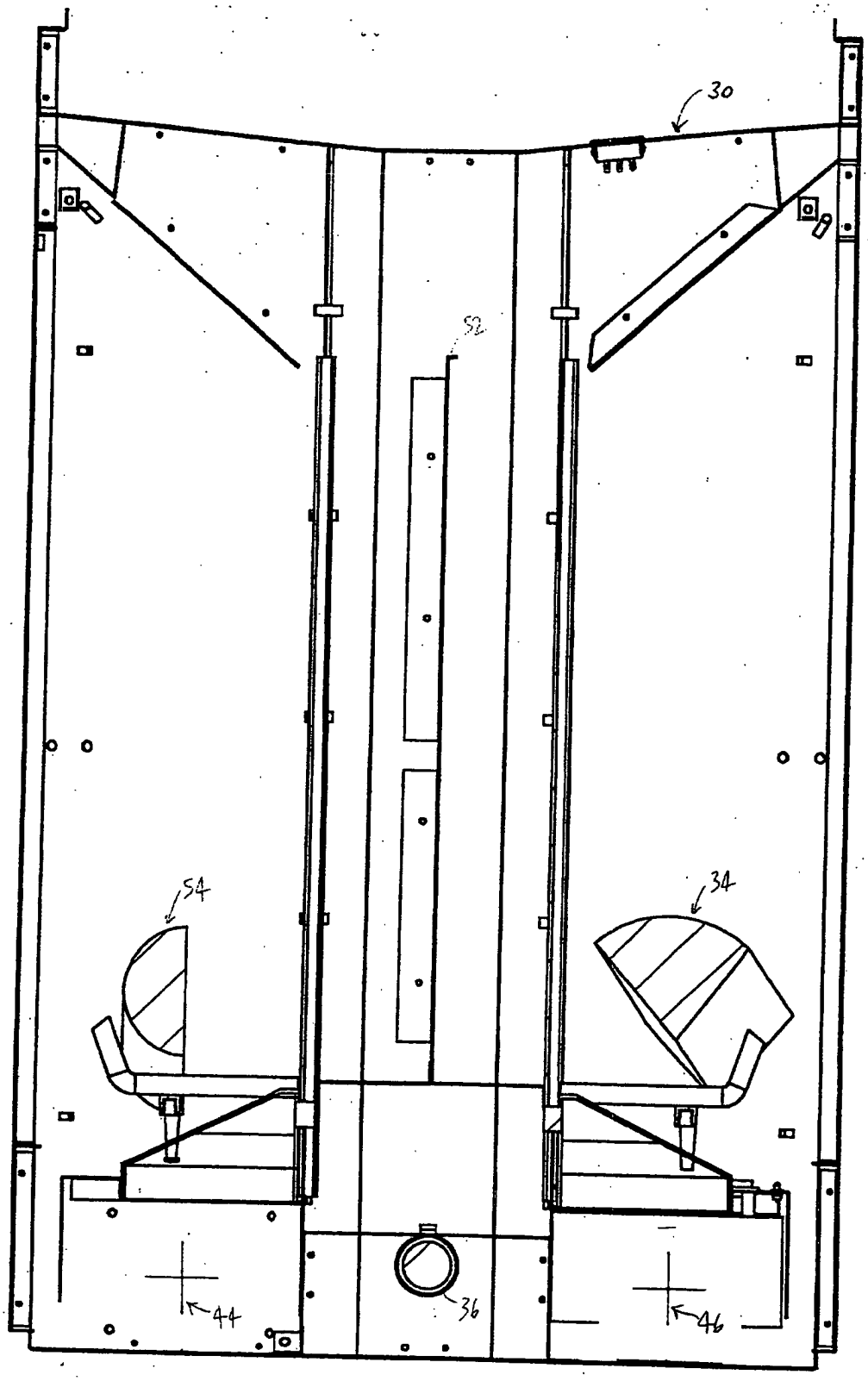

Fig. 21

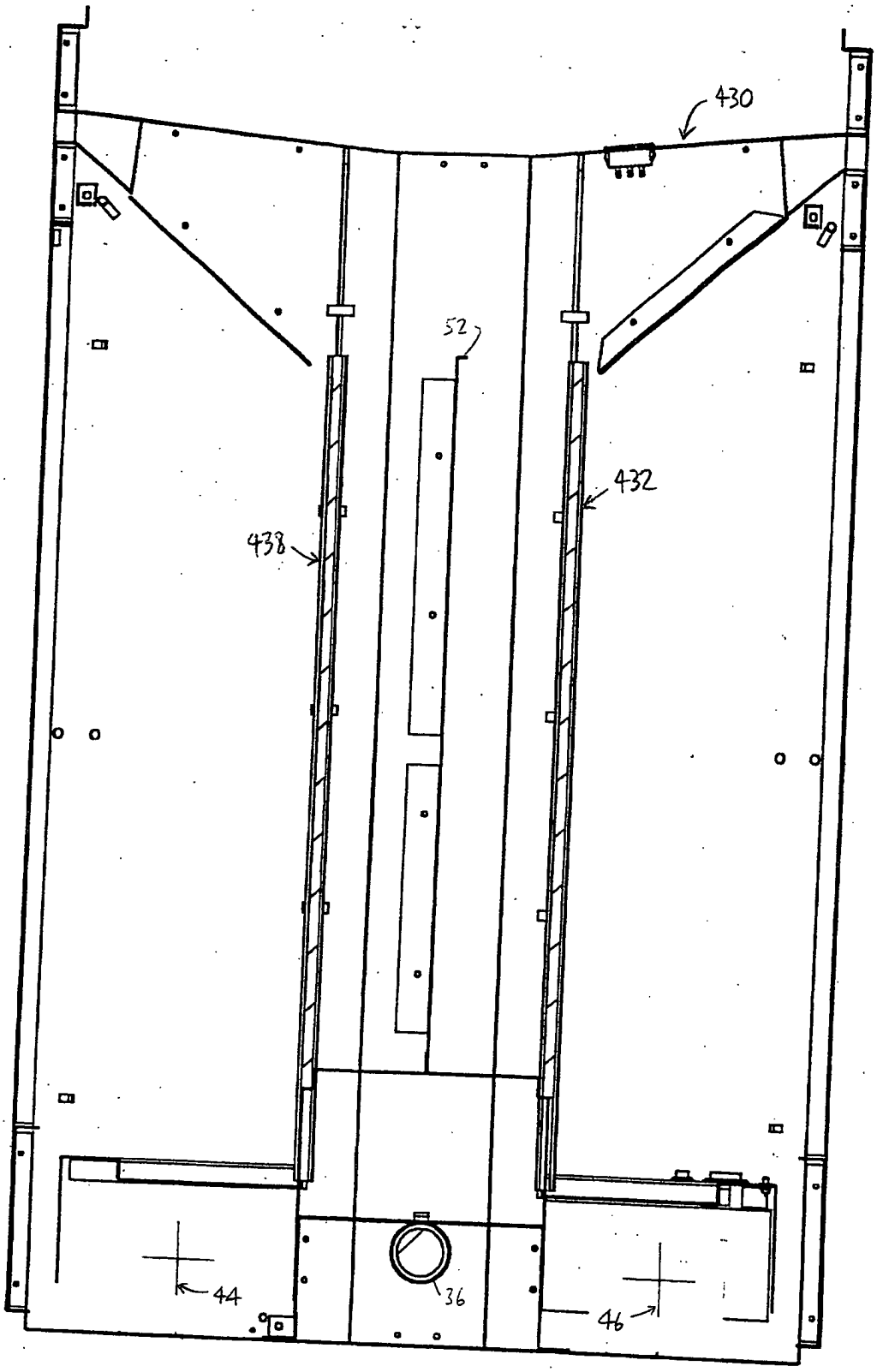

Fig. 22

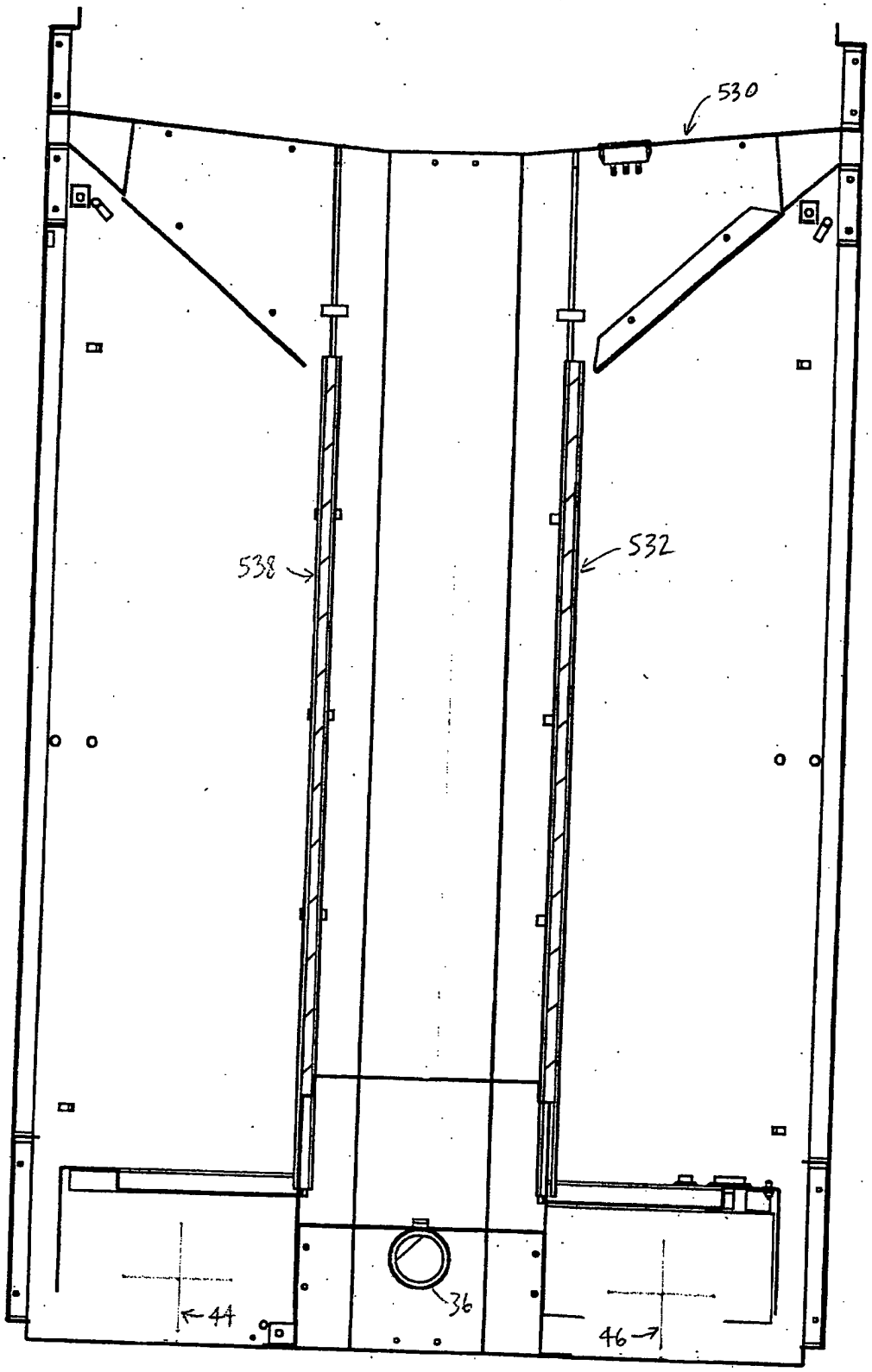

Fig. 23

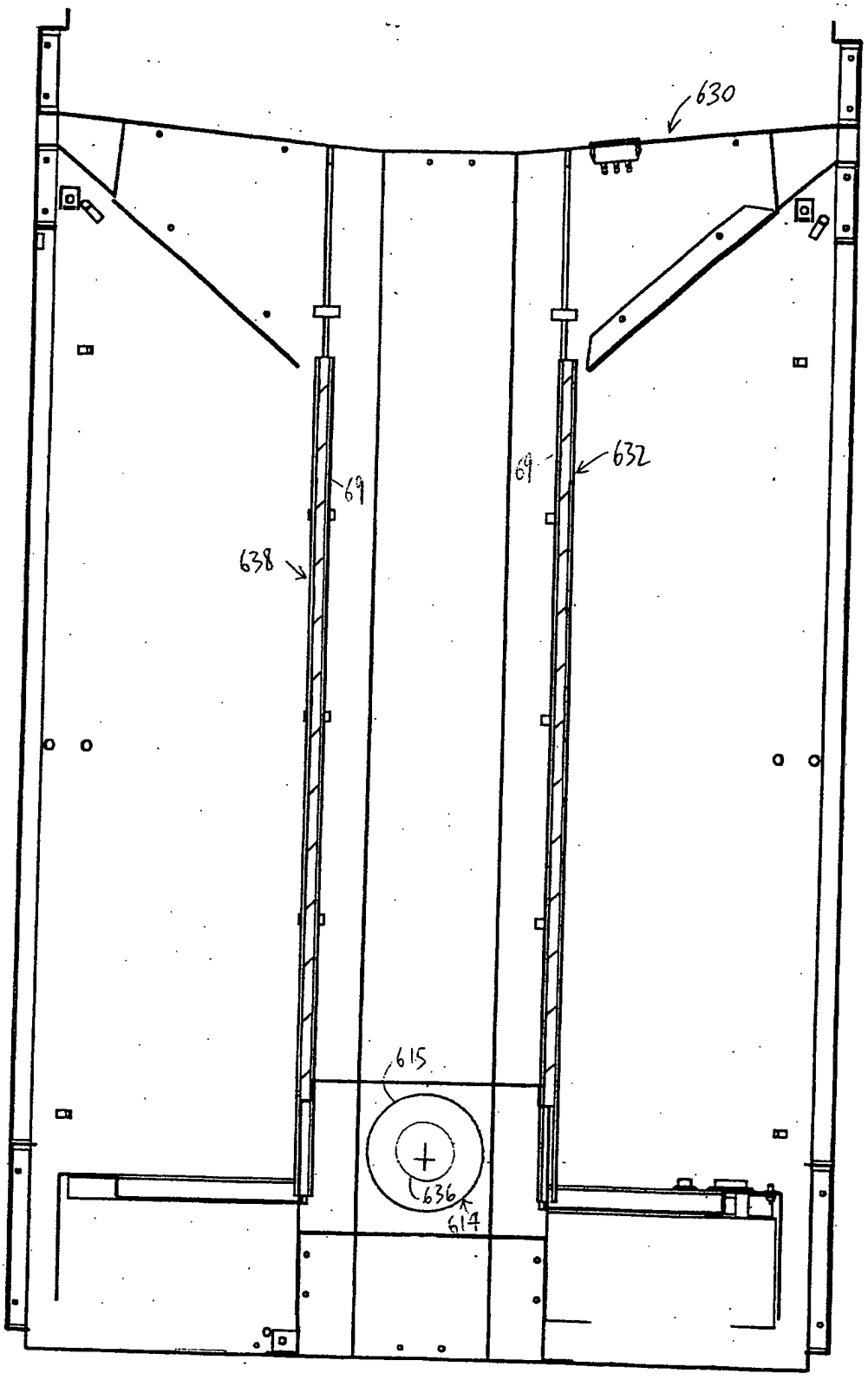

Fig. 24

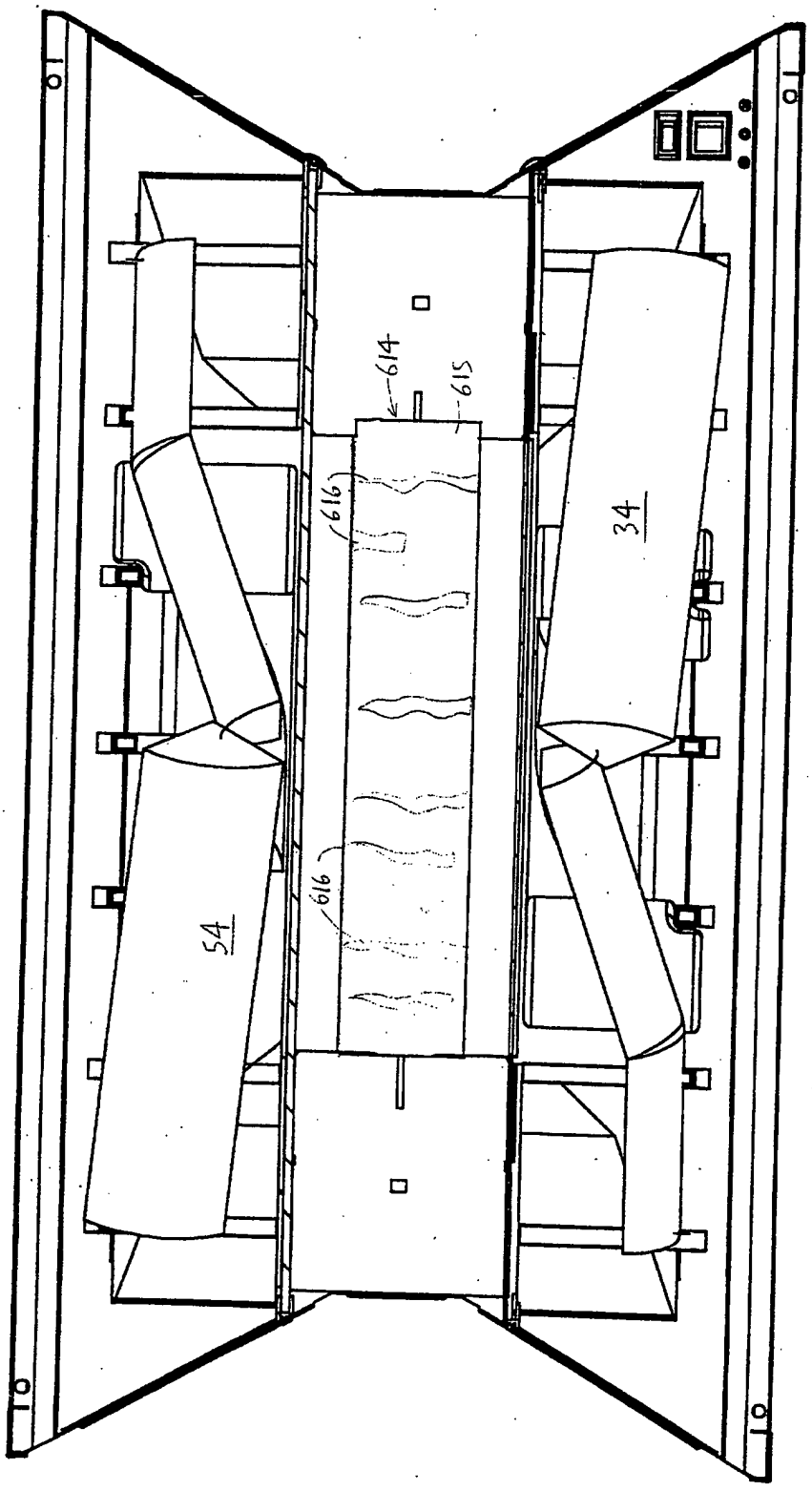

Fig. 25